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APRIL, 1957

METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

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Proper Cleaning Methods Pay Dividends
When to Spray or Dip

**Coatings for Protection of Electroplating
Equipment**
Plastisols, Waxes and Lacquers

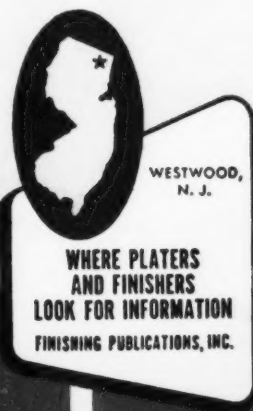
**Detection of Chemical Protective Films on
Aluminum and Aluminum Alloys**
A New Stannic Chloride Drop Test

Analysis of Phosphating Solutions
Colorimetric Determination of Nitrate

**Surface Treatment and Finishing of
Light Metals**
Plating on Aluminum — The Vogt Process

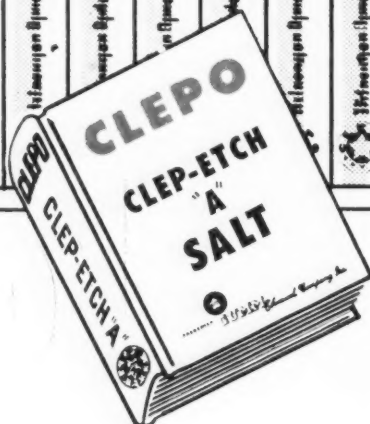
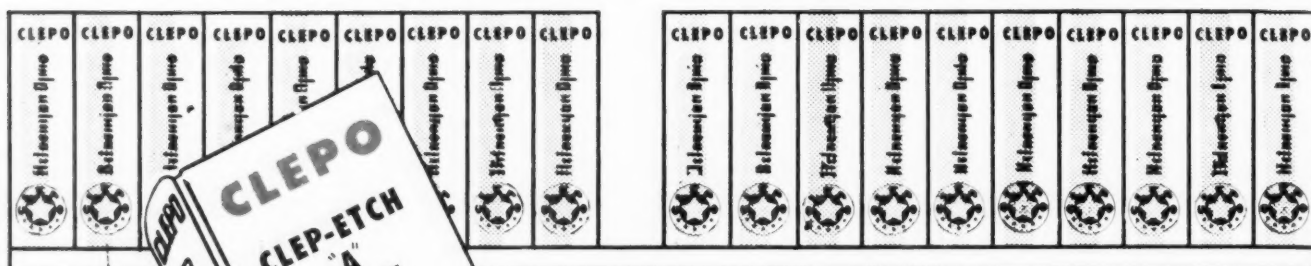
Science for Electroplaters
Chemical Surface Preparation

Complete Contents Page 53



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CLEP-ETCH "A" SALT

3

VALUES

FOR THE PLANT
WORKING WITH
ALUMINUM

Excellent for whitening
Silicon Aluminum cast-
ings before burnishing

Excellent for stripping
anodized castings

Excellent for removing
smut from etched Sili-
con Aluminum Castings

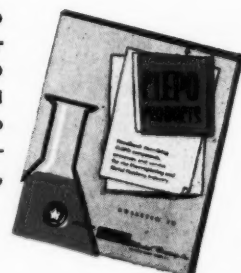
CLEP-ETCH "A" is a dry granular salt which enables the operator to eliminate hydrofluoric acid treatment from his processing. And the solution made by dissolving **CLEP-ETCH "A"** with nitric acid is exceptionally stable. It does not deteriorate in standing. It will not attack the aluminum base metal during normal immersion cycles.

CLEP-ETCH "A" SALT is available in 50 lb. and 325 lb. drums. Write for generous free sample for laboratory tests on your article **CLEP-ETCH "A"** will show up well, we are sure. Then order enough—say a 50 pound drum—to make a comparison run with compounds you are now using. You be the judge of its merits. In writing for a trial sample, please outline your operations so that we can send you proper instructions.

OUR NEW GENERAL CATALOG No. 10

Just Released

It tells about the scores of **CLEPO** Compounds and outlines their many uses. It tells about **CLEPO** Service and lists the skilled field service man in your territory who will be glad to help with *any* problem involving cleaning, stripping, etching, pickling, etc.



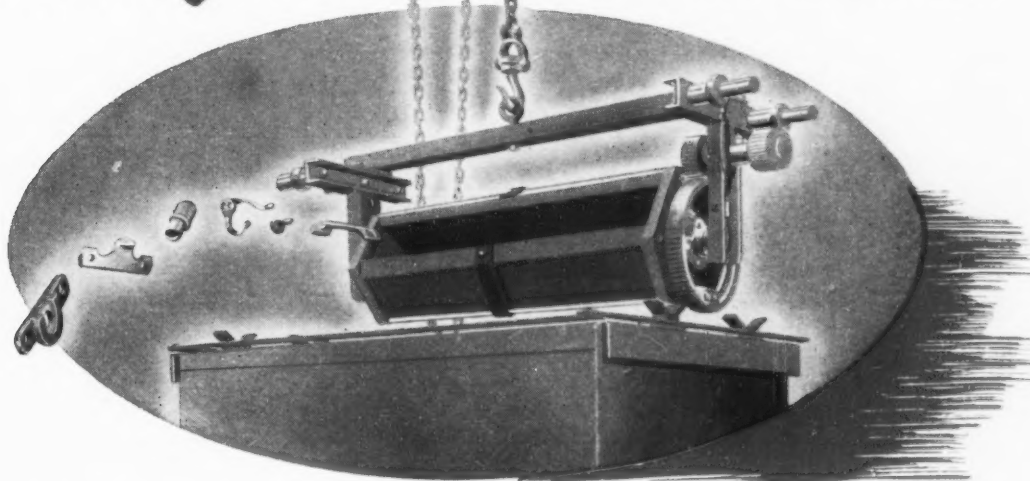
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GUMM

Chemical Company Inc.

538 FOREST STREET, KEARNY, N. J.

Plating on ALUMINUM?



use ENTHONE

ALUMON[®]

For these Reasons...

- ☒ Years of successful use by hundreds of manufacturers.
- ☒ Easy to operate.
- ☒ Very economical — costs less than ½¢ per square foot of surface plated.
- ☒ Skilled chemists work out your plating cycles and aid you in the plant.
- ☒ Alumon is a quality product of high purity materials and is exactly formulated to insure consistency of result.

Write for literature on Alumon and check list of literature on sixty Enthone products and processes for better metal finishing.

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Metal Finishing Processes • Electroplating Chemicals

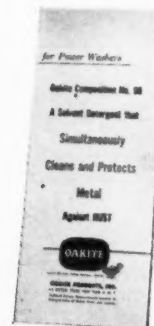
These Oakite shortcuts speed your metal cleaning

1 Cleaning and rustproofing—in one washing operation

Oakite Composition No. 98 (used cold or hot in one-stage or two-stage washing machines) removes cutting oils and chips—while it leaves a thin film that protects steel against rusting between operations or during temporary storage.

Excellent for cleaning before inspection: the metal is cool for immediate handling and the film (too thin to affect measurements) prevents finger prints from corroding highly finished surfaces.

One auto manufacturer uses No. 98 in seven plants for cleaning and rustproofing brake cylinders, camshafts, connecting rods, crankshafts, cylinder heads, flywheels, push rods, tappets, wrist pins, etc.

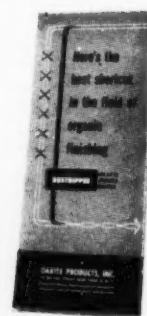


2 Stripping pigmented paints—with no need for pickling before repainting

Oakite Rustripper saves money in paint shops by doing a complete stripping job in one operation. It eliminates extra pickling and neutralizing to remove the metallic pigments, phosphate coatings and rust that prevent successful repainting.

A television manufacturer says "We formerly took 25 minutes to strip rejected cabinets, then had to pickle to remove tarnished phosphate coatings. Today 10 minutes in Rustripper strips the same cabinet so bright and clean you can't tell it from new. Eliminates pickle, neutralize and rinses."

An auto parts maker uses Rustripper for continuous conveyor line stripping. "Cycle of 1 minute and 50 seconds works like a charm stripping paint and incidental rust from rejects and hooks."

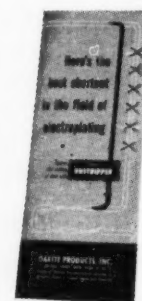


3 Cleaning, derusting and descaling—in one alkaline tank

Oakite Rustripper saves money in plating shops by removing rust or heat scale at the same time it removes oil and other soils. Alkaline pickling with Rustripper avoids hydrogen embrittlement, etching of machined surfaces and other disadvantages of acid pickling. Rustripper is also used for pre-cleaning or electrocleaning in plating lines.

An aircraft manufacturer who formerly sand blasted to remove heat scale says "Now the scale is removed in 30 minutes in a boiling soak in Rustripper."

A job plater who adds Rustripper to his reverse-current cleaner in an automatic plating machine, says "We used to clean 45 seconds. Now 20 seconds cleans sparkling bright... saves precious time..."



FREE

Write
for
booklets

OAKITE PRODUCTS, INC., 18 Rector St., New York 6, N. Y.

Send me the FREE booklets indicated below:

- 1 "For Power Washers—Oakite Composition No. 98"
- 2 "Here's the best shortcut in the field of organic finishing"
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in Principal
Cities of U. S. and Canada

Export Division
Cable Address: Oakite

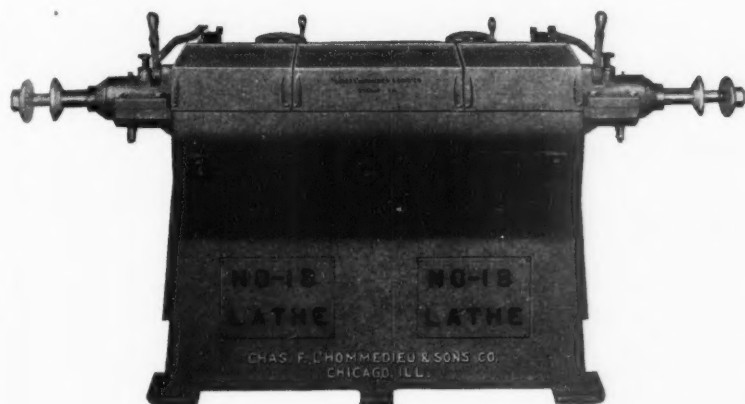


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Entered as second class matter at the Post Office in Westwood, N. J. Volume 55, No. 4, April, 1957. Four Dollars Per Year.

For 59 Years ... **L'HOMMEDIEU** *...*

**year after year has manufactured Reliance
Plating, Polishing Equipment, Supplies for
Better and More Profitable Metal Finishing**



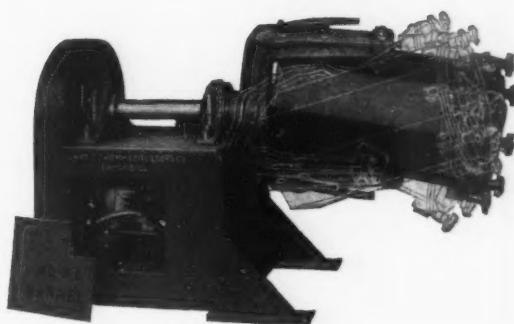
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The cylinder can be operated at an angle for producing a double tumbling action—thus producing a better and more uniform finish in a much shorter time.

Longer pieces finished more uniformly and without bending.



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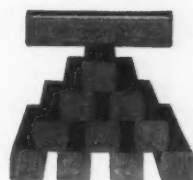
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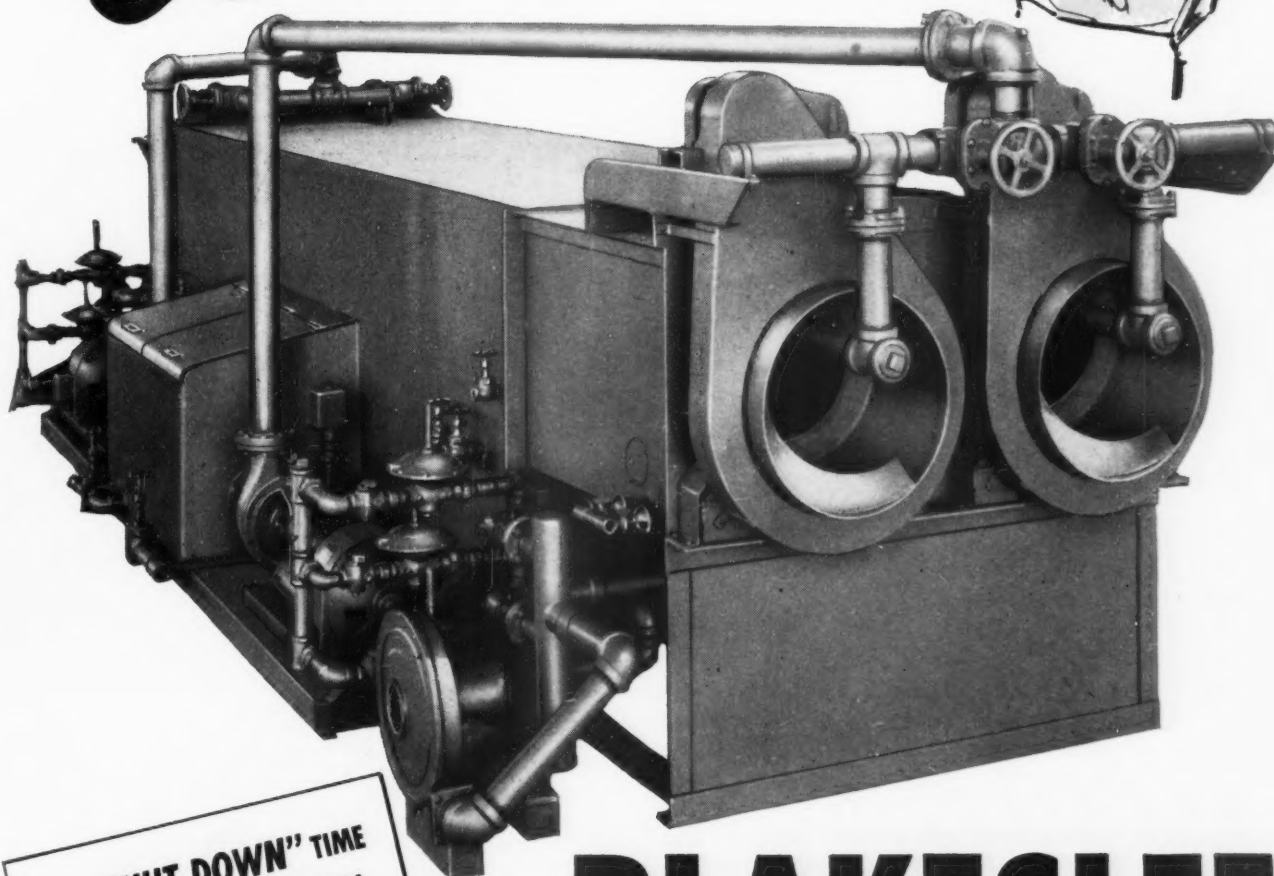
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are built to last...Give real economy in production.
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Quality

is consistent when you polish and buff
the *Acme* way!

Acme can build you a polishing and buffing machine to turn out part after part on schedule, and always with the same high quality of finish. That's why so many manufacturers turn to Acme to solve the tough ones.

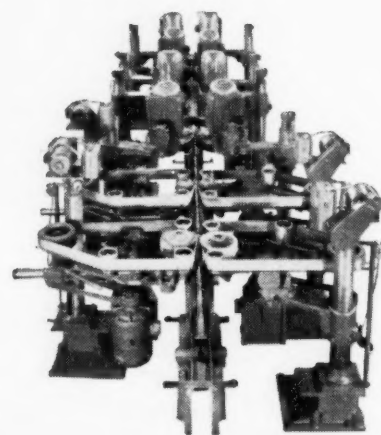
Unusual contours or surface conditions won't stop Acme's specialized engineering talent—they'll build an automatic operation to handle it faster and cheaper. Maybe lack of space is your problem—Acme engineers working with flexible Acme standard units can often add to the number of operations on a single machine and eliminate the need for additional machines on the line. Or perhaps redesigning the indexing cycle to add more polishing or buffing heads on an existing machine can speed up production. Whatever your polishing and buffing problem is, the Acme man can help you.

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Want proof? Send us your polishing and buffing problem and we'll give you our recommended solution in an Acme automatic machine.



This Acme automatic straight-line machine with individual fixtures completely polishes and buffs upwards of 1,400 pieces per hour. Four Acme G-3 belt polishing heads with floating back-up wheel and vertical oscillation are followed up by eight Acme G-3 adjustable floating head buffing lathes.

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METAL FINISHING, April, 1957

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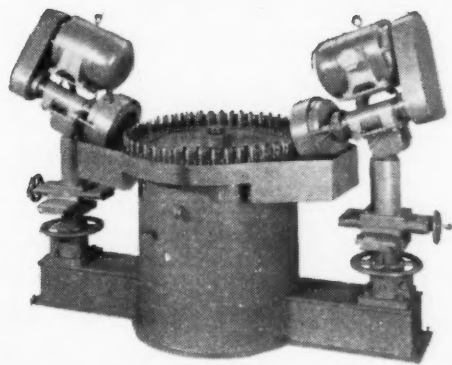
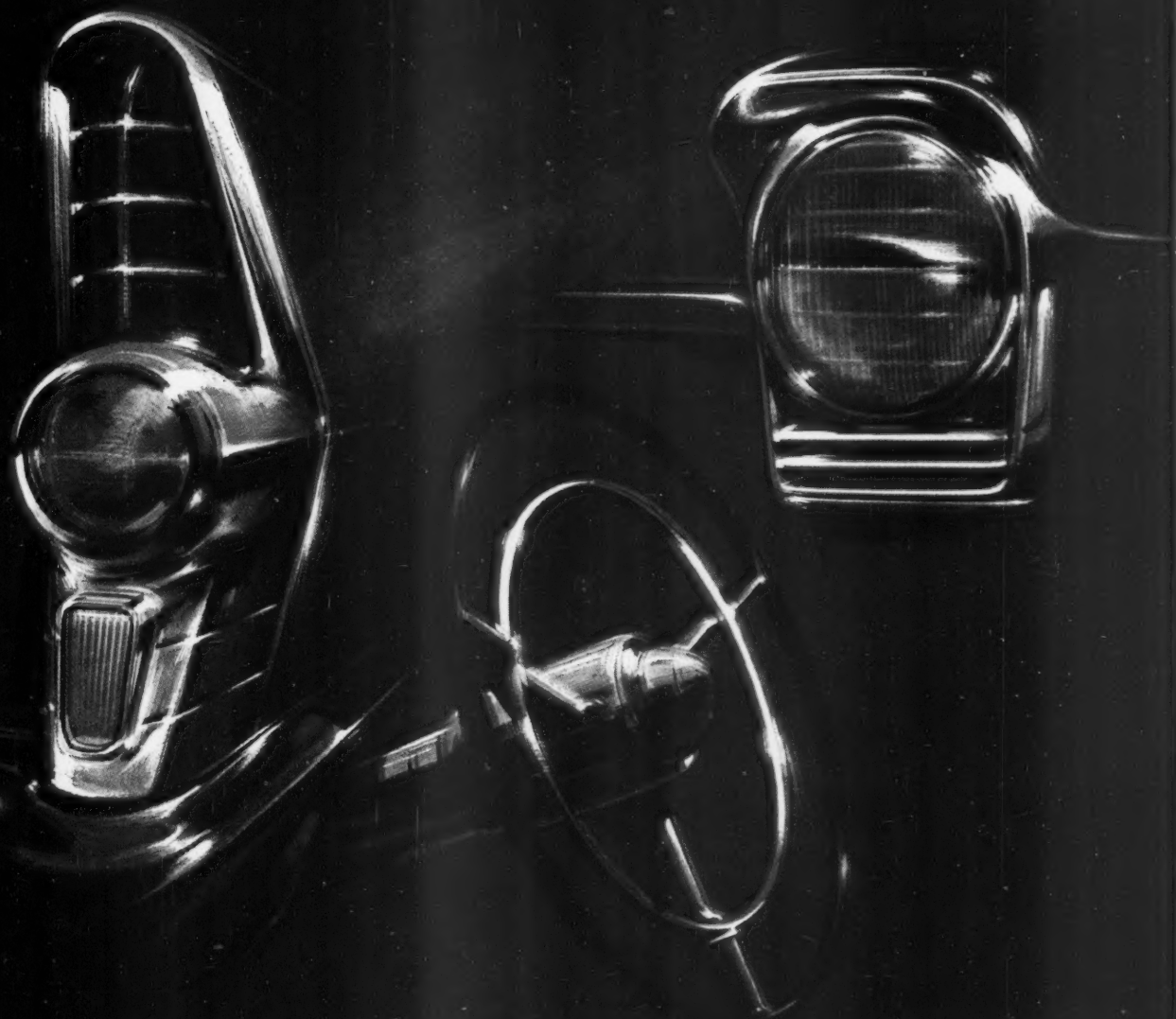
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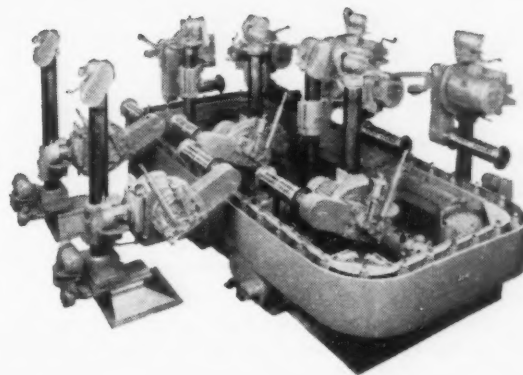
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OF

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Extremely high volume can be put through this setup, for spot face grinding valve rocker arms. This Acme 36-inch continuous rotary table, with grinding wheel heads having cup wheels, can be quickly adapted to a variety of small castings.



An Acme rectangular polishing and buffing machine with eight Acme heavy-duty adjustable floating head lathes having 25-HP motors, equipped with 24" cartridge type spindles with remote control traverse feed on each head. Production can run several thousand pieces per hour.

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

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METAL FINISHING, April, 1957

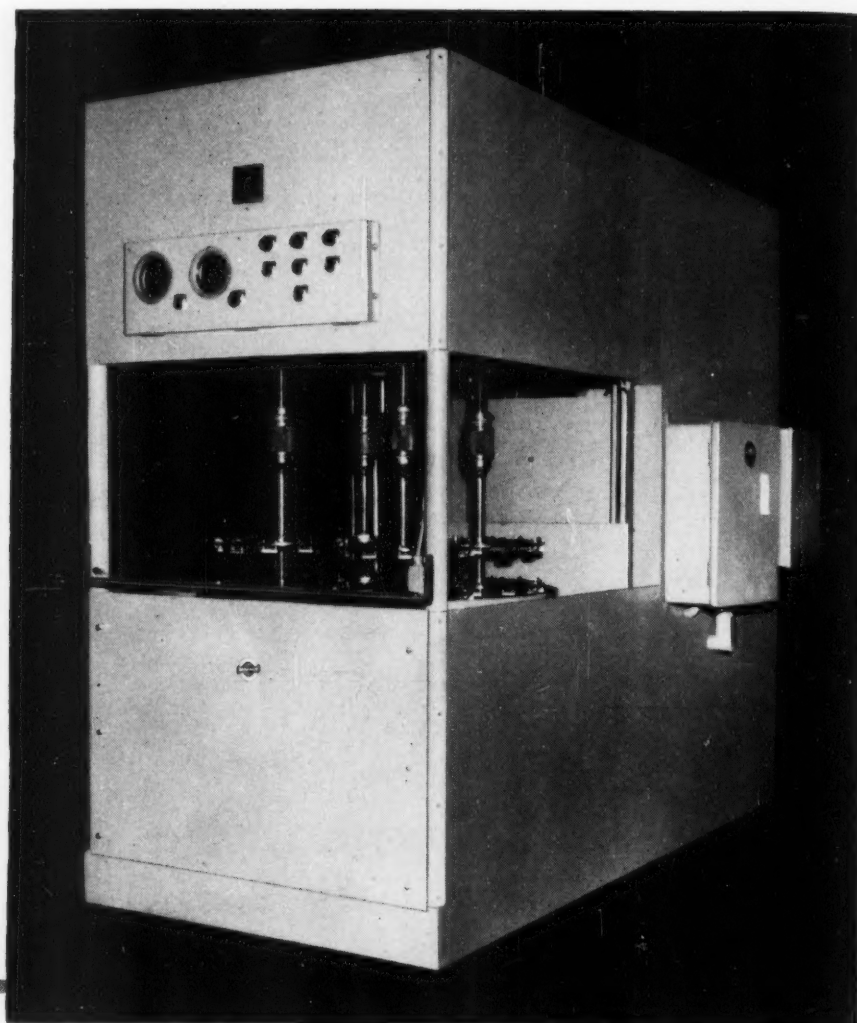
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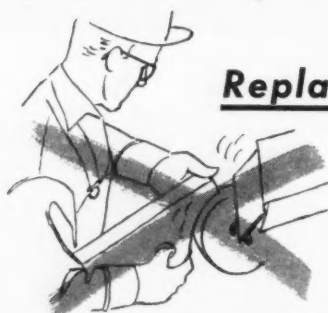


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Wipe the slate clean of all present concepts of speed, efficiency and costs in pre-plating finishing of brass, zinc-base and aluminum die-cast parts! In one short, automatically-timed operation—and on a *multiple mounting* of parts—new SPIN-FINISH produces surfaces and lustre equal to or surpassing that of buffing.

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- ☒ No set-up time required for changing jobs

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ALL-PURPOSE SELENIUM RECTIFIER

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A flip of the switch... and SILVERLINE provides maximum amperes for 2V-7V plating needs. Another flip of the switch... and SILVERLINE provides maximum amperes for 5V-12V specifications. Both with 5% ripple.

Also, SILVERLINE's improved dial board with 42 positions of control to tap, offers precise regulation... exact adjustment.

With assured maximum amperes for greater flexibility to meet practically all plating needs... with greater dependability for continuous performance... and fully equipped with meters and shunt... SILVERLINE is the indispensable all-around Selenium Rectifier for the plating industry.

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S I L V E R L I N E

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Pioneers in Selenium Rectifiers

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NEW YORK 61, N. Y.

TALMADGE 8-2200

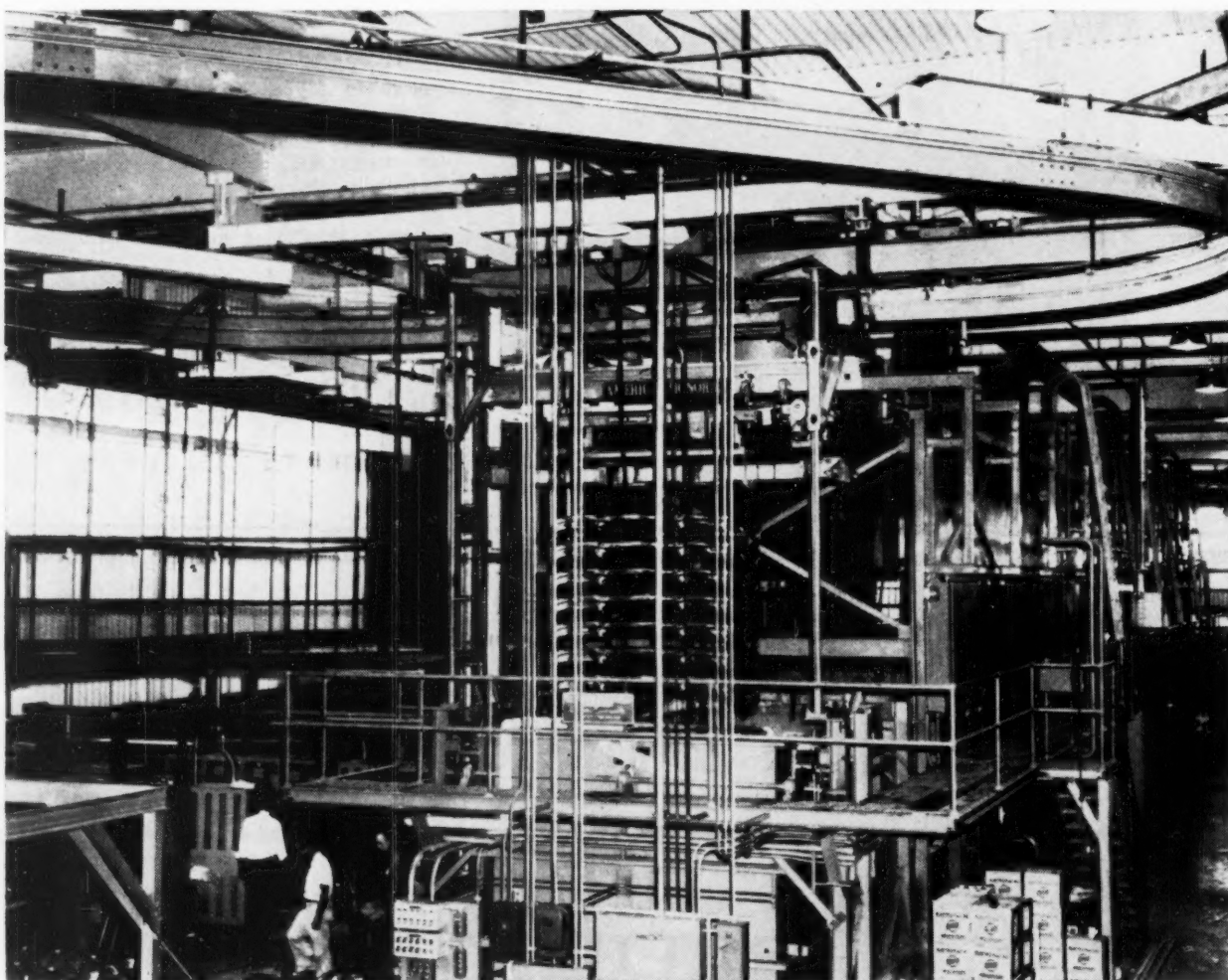
Udylite Builds Largest Plating Installation On West Coast

IN an orange grove setting, near Fullerton, California, Rheem Automotive Company now has in operation the largest plating installation on the West Coast. It was designed and built by the Udylite Corporation under the supervision of the L. H. Butcher Company Division. Udylite furnished a complete "package" for the cleaning and plating facility.

Rheem manufactures the complete bumper right from panels of high tensile steel. Before plating, these

panels are pickled, polished, bonderized, rinsed, formed, and then transferred by an overhead monorail system to the plating department. Here, in an area the size of a football field, the bumpers travel through thirty-one operations.

Upon arrival at the plating department, ten to sixteen bumpers are placed on each rack in a floor level racking area. The racks, mounted on work carriers, are delivered automatically to the Udylite pre-plate unit by



Bumpers loaded on plating racks are automatically transferred through this seventeen tank pre-plating unit giving chemically clean surfaces prior to nickel plating.

(Advertisement)



Lineup of 5,000 ampere, 18 volt Udylite-General Electric Germanium rectifiers (right) and Inductrol automatic voltage regulators are shown mounted on overhead catwalk.

the monorail system. This automatic machine is 133' long x 15' wide x 22' high. It operates hydraulically and routes the work through a pre-plate cycle as follows: 1) Load and Soak Clean; 2) Electrolytic Clean; 3) Cold Rinse and Spray; 4) Anodic Acid; 5) Cold Rinse and Spray; 6) Electrolytic Clean; 7) Cold Rinse and Spray; 7A) Drain and Transfer; 8) Acid Dip; 9) Cold Rinse; 10) Nickel Strike; 11) Cold Rinse; 12) Acidified Rinse.

After the cleaning and surface preparation, the work carriers with their racks of bumpers are delivered selectively to either of the two nickel plating lines where they are then placed in the nickel plating tanks on a predetermined time cycle.

The nickel line consists of two sections; each composed of sixteen tanks; twelve contain nickel plating solutions. Each nickel plating tank has conforming anodes and cathode bar agitation and contains, 3,750 gallons of solution which is continuously filtered and heated by heat exchangers. Each tank is powered by a 5,000 ampere, 18 volt Udylite-General Electric Germanium rectifier with automatic stabilized voltage control.

Work carriers are picked up at the end of the nickel line and are transferred to inspection stations by means of the continuous monorail system, prior to final chromium plating.

After inspection, work carriers are automatically delivered to the chromium plating line and handled by a manually operated monorail system through a series of ten cleaning, rinsing and chromium plating tanks.

Then, after chromium plating, the work carriers are automatically picked up and delivered to an unloading area where the plated bumpers are removed for inspection and palletizing.

When the plating operation is completed and the racks have been emptied, the work carriers and racks are routed through an electrolytic rack strip tank which contains 31,000 gallons of solution. The stripped racks

and work carriers are transferred back to the loading area ready to again go through the cycle.

There are other features of interest concerning this large installation. Solutions are heated by steam from two cross-drum type boilers of 500 H.P. capacity. Temperatures on all processing solutions are closely controlled by special thermostatic devices.

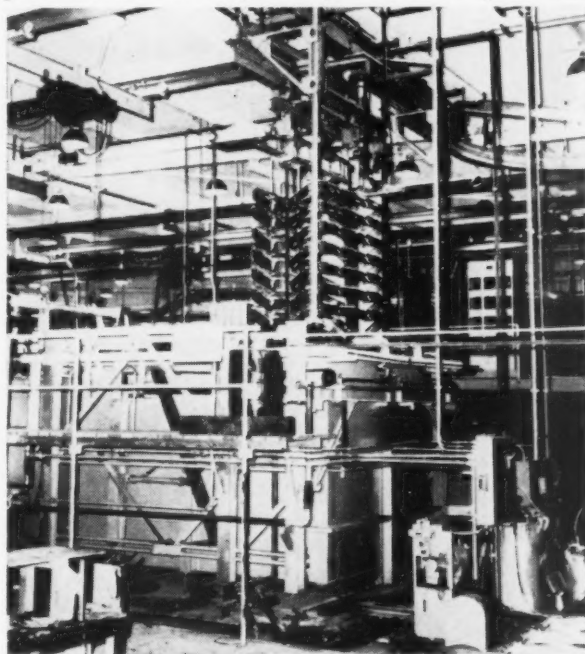
Koroseal, Plastisol or Neoprene tank linings are used wherever acid or other corrosive conditions are encountered. Giant fans and water-wash fume exhausters remove fumes and vapors from processing tanks.

Udylite-General Electric Germanium rectifiers were selected for the new Rheem Automotive bumper plating line. These rectifiers produce 160,000 amperes of direct current. It is believed to be the largest installation of germanium rectifiers in the plating industry. The 15 and 18 volt, air cooled units were selected by Udylite electrical engineers and built in the General Electric Rectifier Department at Lynn, Massachusetts. All are equipped with Inductrol automatic regulating control making possible automatic voltage or current stabilization. Units are housed in 5,000 ampere cubicles, with 18 of these mounted on the mezzanine floor to power nickel plating tanks. These 18 volt units are easily accessible from the nickel line catwalk. Two 15,000 ampere and two 20,000 ampere units, each rated at 15 volts, are floor mounted.

The 5,000 ampere cubicles, because of their compact size and light weight, enabled a "building-block" arrangement designed for maximum installation flexibility and ease of maintenance. Each cubicle contains three blowers, five power trays and five transformers. Germanium cells are hermetically sealed from the plating room atmosphere to prevent corrosion.

As an added safety feature, a protective device is incorporated in each unit, which first gives a warning signal when current or temperature limits are exceeded and finally shuts the unit down automatically before damage is done.

These germanium plating rectifiers have a full load efficiency as high as 85 per cent, resulting in reduced power costs, according to Udylite rectifier specialists.



A plating rack load of chrome plated automobile bumpers is being removed from the last operation of the chrome plating line by the automatic overhead monorail system.

(Advertisement)



NO CURE-ALL FOR SALE!

Experience with plating waste treatment has shown staff and consulting engineers that no one process or type of equipment is generally applicable to all problems. Thorough evaluation of the many factors involved is necessary in each case.

Whether the solution required is ion exchange or precipitation Graver has complete equipment to do the job.

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 T-136 — Plating Waste Solutions — Recovery or Disposal
 T-130 — Ion Exchange A Practical Tool in the Plating Room
 T-123 — Applications of Ion Exchange to Plating Plant Problems



Industrial Waste Treatment Dept. W-113

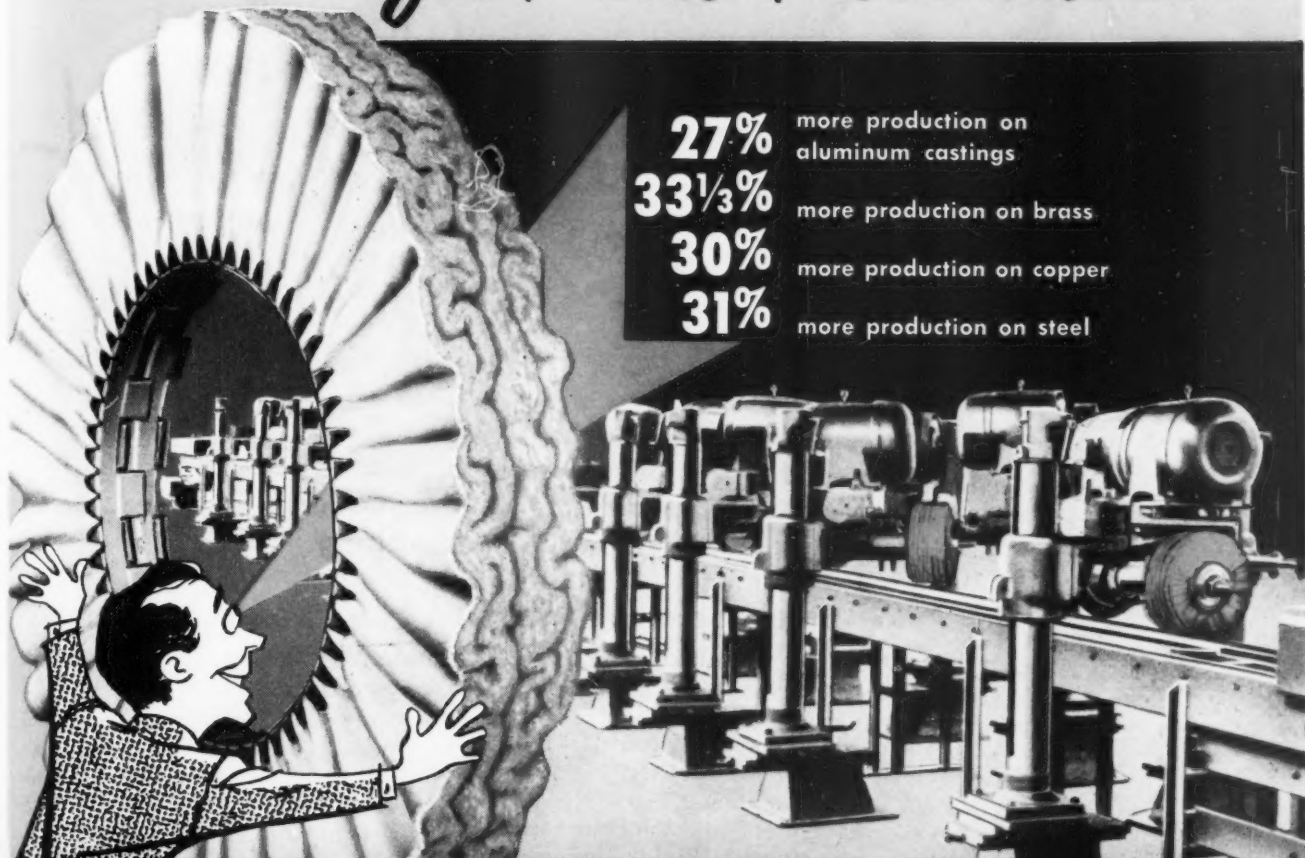
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GUARANTEE 25% to 33 $\frac{1}{3}$ % MORE OUTPUT
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COOLER RUNNING American Centerless Buffs permit *faster machine speeds without burning* . . . longer buff life, fewer changeovers, increased output of every man and machine!

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Centerless
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Centerless (Sewed)
 UNIT CLOTH BUFF
Centerless (Unsewed)
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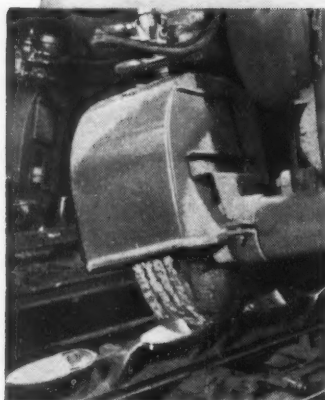
"For the job that's tough... use an American Buff!"

ALWAYS FINISHES FIRST

- And saves on compound-
it's "metered"!

Liquimatic

the perfect liquid compound
for all metal finishing



How much of the compound in your buffing room is wasted... in the nubbin pile, or in "over-heading" buffs? There's a way to "meter" the compound you use—the Liquimatic way. An electrically timed system in the Liquimatic Process feeds the exact amount of liquid compound for the exact cut you need. While compound is being saved, buffs are being saved too... continual lubrication extends buff life up to 200%.

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alone soon pay for a complete Liquimatic Application System. But there are still other ways Liquimatic will help you cut costs. No hand application, and no changing of bars will effect substantial downtime savings for you... and Liquimatic's ease of cleaning means even further economies. Now—when production must be upped, and costs lowered — profit from Liquimatic—over and over again.

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Liquimatic ...

gives more buff mileage

These additional Liquimatic features mean real savings
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H-VW-M

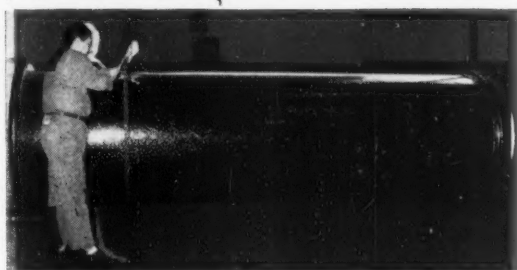
INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES



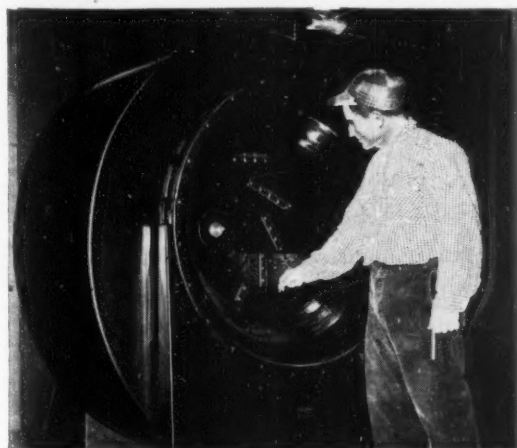
Our years of experience give you . . .

BALANCED QUALITY*

in **MICCROSOL**



ABOVE: Large duct section coated by spraying with Miccosol Spray S-2003. BELOW: Fan housing coated by dipping in Miccosol E-1003.



Developed originally as a coating for plating racks, Miccosol E-1003 has all the desirable characteristics which make it an ideal coating for many other applications.

The chemical resistance of Miccosol is unequalled in its field. Its toughness, abrasion resistance, resilience, and flexibility are unsurpassed. It's easy to apply in either a *dip* or *spray* formula. When necessary, it's easy to repair.

Year after year we build this quality into Miccosol, improving it whenever possible and practicing every economy in its manufacture that does not compromise the excellence of the product.

This **BALANCED QUALITY** enables you to use Miccosol *profitably* while assuring your customers of coating jobs that will prove superior in their performance.

**Outstanding performance and value*

For tanks, ducts, and other equipment

IT'S TOPS!



Developed and manufactured by
experienced platers and coaters

MICHIGAN CHROME and Chemical Company
8615 GRINNELL AVENUE • DETROIT 13, MICHIGAN



MANY FINE SURFACES REFLECT THE USE OF PFIZER CITRIC, GLUCONIC AND TARTARIC

ACIDS—Pfizer Citrates, Gluconates and Tartrates contribute to brightness like you see above. Whether it be through electroplating, cleaning or polishing, these Pfizer organic acids offer many advantages to metal finishers. One big advantage is **NON-TOXICITY**—greater safety for personnel in materials handling. Another advantage is mildness—so necessary in household and specialized industrial cleaners and polishes. Write for *Technical Bulletin 61* which describes in detail the many outstanding uses for **PFIZER ORGANIC ACIDS** in metal finishing.

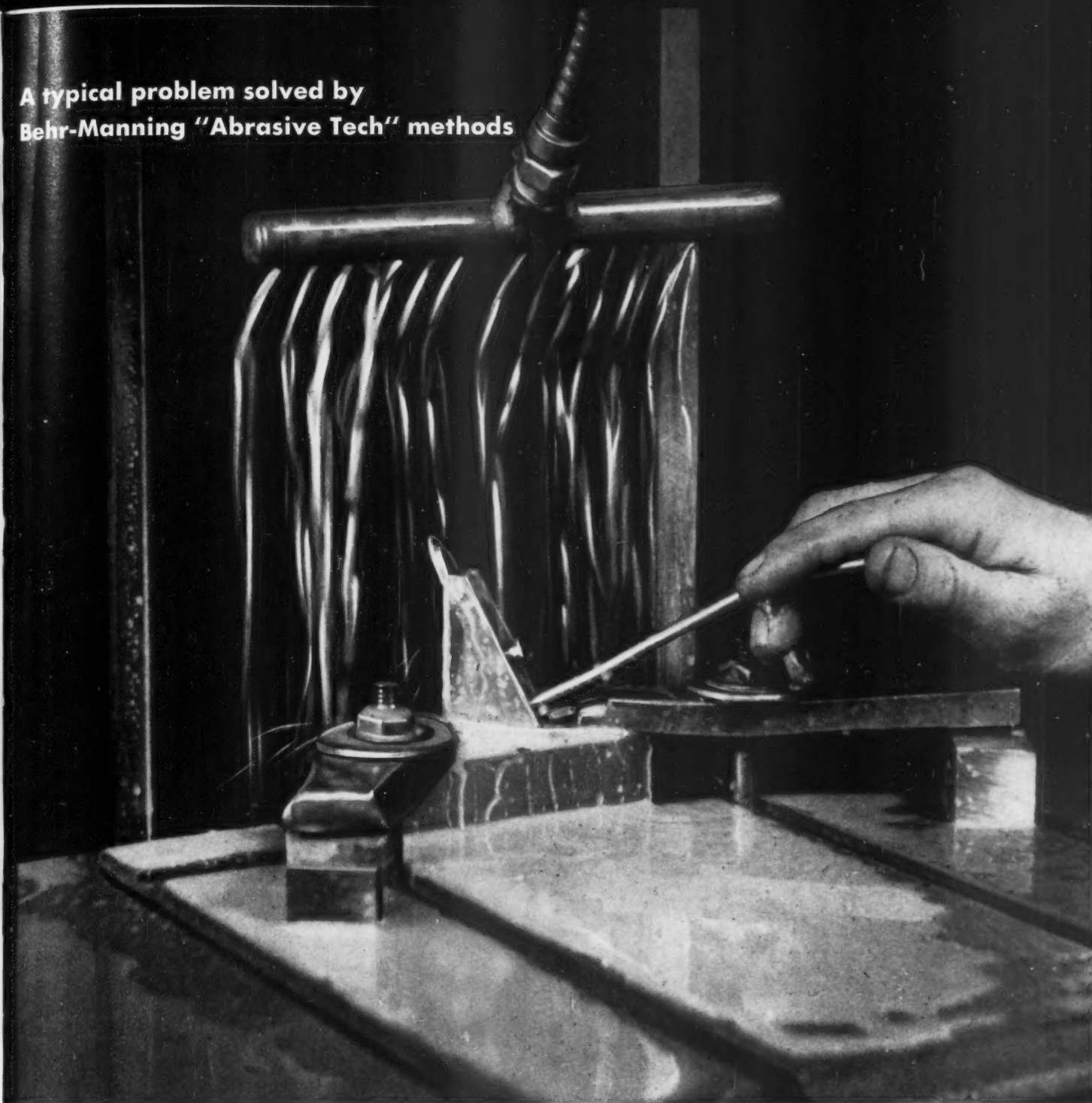
Manufacturing Chemists for Over 100 Years



CHAS. PFIZER & CO., INC.
Chemical Sales Division

630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.;
Vernon, Calif.; Atlanta, Ga.; Dallas, Texas

A typical problem solved by
Behr-Manning "Abrasive Tech" methods



30 minutes were cut to 18 seconds when this vertical platen belt grinder replaced a lathe in shaping boroscope mirrors. Cut at an angle from round bar stock, they need to have their bottom angle shaped to match the top angle, an operation accomplished by placing them in a fixture and rotating them against a moving Speed-wet Durite belt. This "Abrasive Tech" method is an example of the Behr-Manning technical service that may provide more production efficiency for your plant.

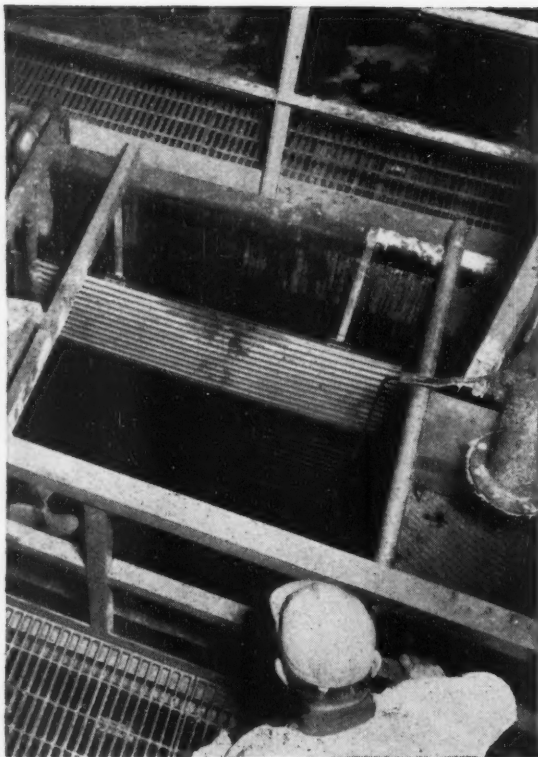
A Behr-Manning methods engineer can often give valuable aid in overcoming stubborn finishing problems. All you have to do is call the nearest Behr-Manning office. Seventeen well-equipped "Abrasive Tech" Methods Rooms are waiting to show you the newest techniques: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, Teterboro, Camden, San Francisco, Seattle, St. Louis, and Brantford, Canada. Main office and plant: Troy, N. Y. For export: Norton Behr-Manning Overseas, Inc., New Rochelle, N. Y., U.S.A.

BEHR-MANNING CO.

A DIVISION OF NORTON COMPANY



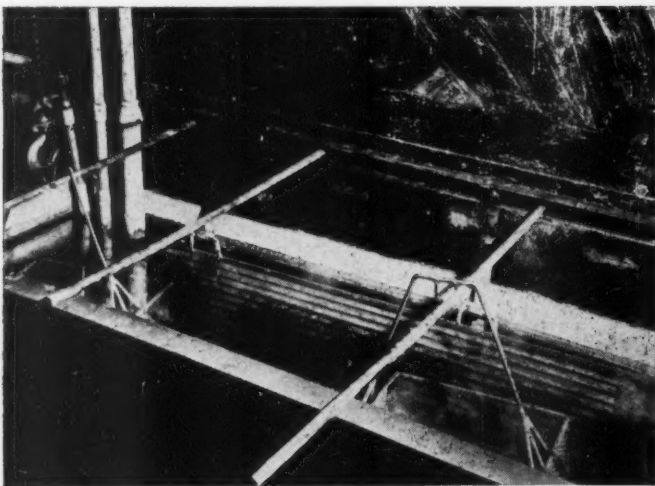
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes



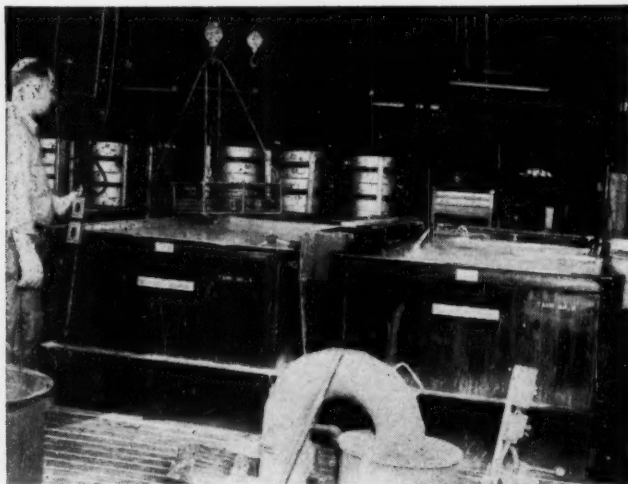
Platecoil units, in the world's largest plating plant, have the speed and dependability to keep up with operations that turn out 1 bumper every 3 seconds.

TRANTER PLATECOIL® STREAMLINES HEAT TRANSFER, CUTS PLATING AND FINISHING COSTS

As streamlined in performance as they are in appearance, Tranter Platecoil units are making big savings for platers and finishers by replacing bulky, old-fashioned pipe coils for heating and cooling. Their solid, relatively flat surfaces resist fouling and scaling and give longer life. When they do have to be replaced, two men can do the job in minutes without hoists or other machinery. And experience has proved Platecoil units heat or cool more quickly and efficiently. Streamline your operations now, and install Tranter Platecoil.

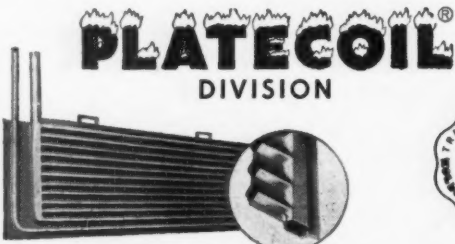


Platecoil makes it possible for this anodizing tank at Jack & Heintz, Inc., to handle more work per load and more loads per shift to increase production 25%.

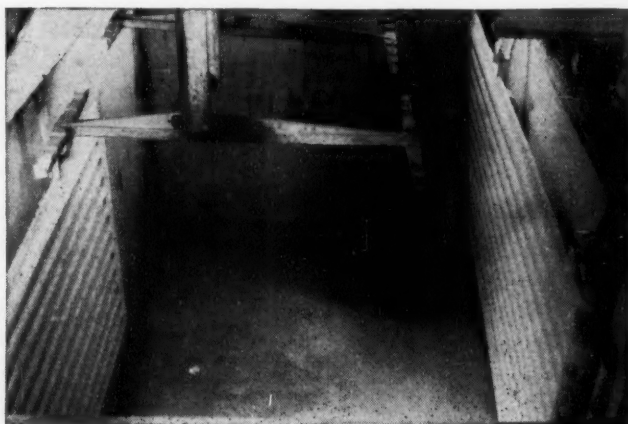


Compact, streamlined Platecoil makes room for 3 times the load in a tank at Continental Motors. Pipe coils also require twice as much time for cleaning.

Streamline your plating and finishing operations with Tranter Platecoil. For more information, send today for Bulletin P-52.



TRANTER MFG., inc. Lansing 4, Michigan
You'll Find Our Catalog in Sweet's Plant Engineering File.

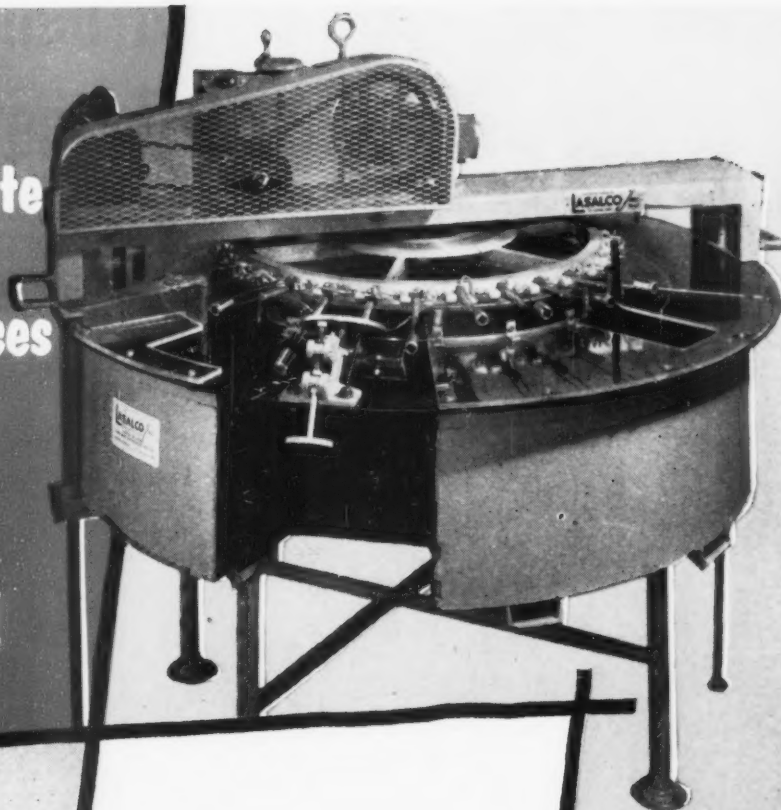


Requiring a minimum of tank space, Platecoil units have sufficient transfer capacity to help speed automatic plating at Atwood Vacuum Machine Co.

6

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Chrome Plate
over
3200 Pieces
Per Hour
with
One
Operator!



LASALCO's *New* **CIRCULAR** **CHROME PLATER**

Cost-cutter . . . time-saver . . .
production-booster! Consider the unusual extra
profit possibilities with this new high current density,
continuously-moving cathode chrome plater:

- Exceptionally high output—3290 pieces, up to 3" long, per hour at 23 seconds. Minimum output, 530 pieces per hour at 2.39 minutes. (Alternate slower drives for heavier plating.)
- One-man loading . . . fully automatic unloading.
- No racks . . . no rack upkeep.
- Easily removable sectionalized cover of Plexiglas, plus easy-to-raise driving mechanism and cathode wheel, gives quick access to coils and anodes. Parts falling into tank are instantly recoverable.
- Simple installation requires only electrical connections and exhaust duct. Plater delivered complete, ready to install.

Write Now . . . Get The Facts About This Money-Maker

LASALCO, INC.

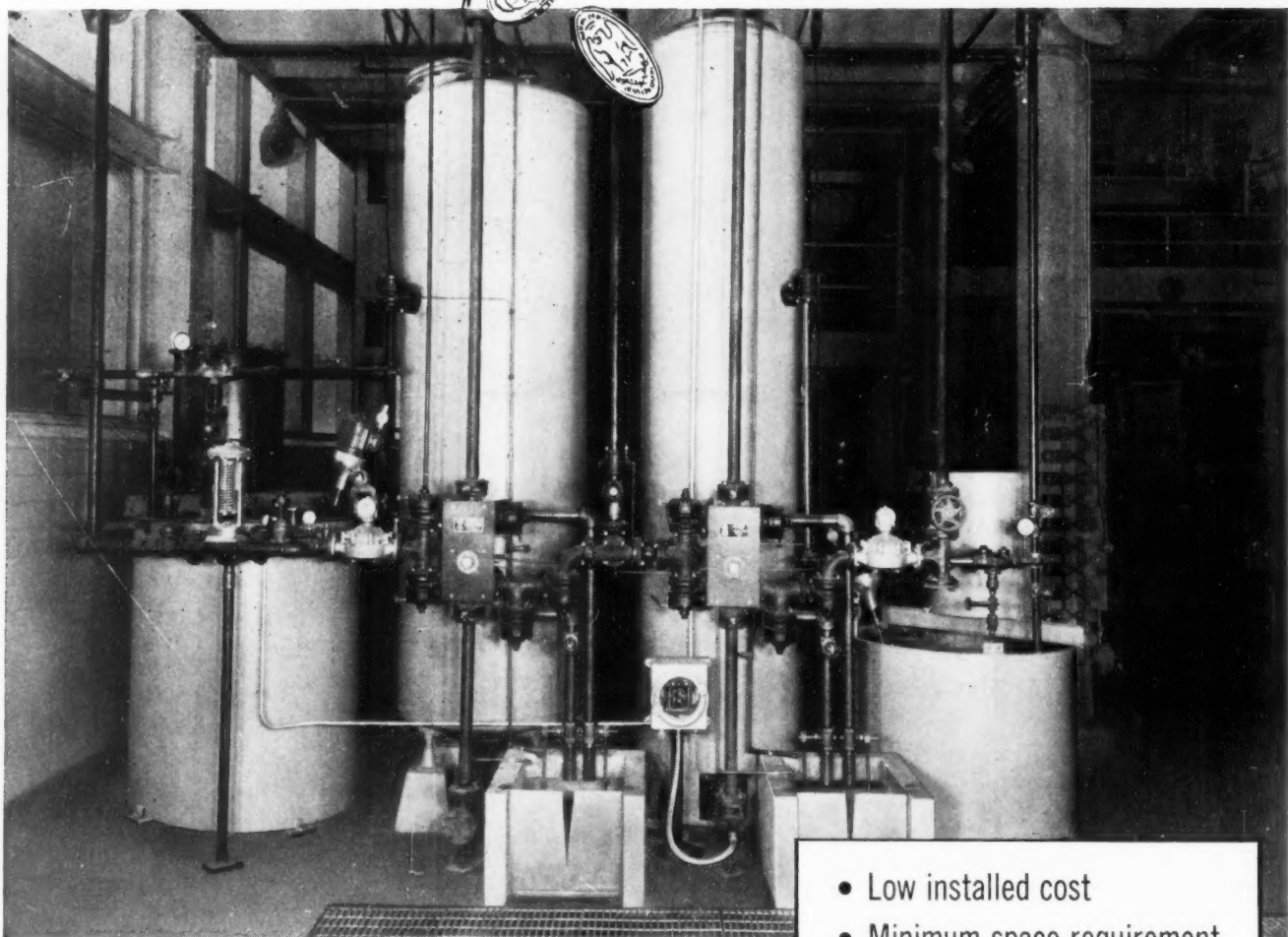
HOME OFFICE
2820 LaSalle St. • St. Louis 4, Mo.
PRospect 1-2990

IN TEXAS
1113 Perry Road • Irving (Dallas), Tex.
Phone: Blackburn 3-4921

SPECIFICATIONS

Cathode Wheel Diameters 30". 31
Bronze Work Carriers 3.24" O.C.
Effective Plating Travel 68.4".
Inner Anode Diameter 24"; Outer
Anode 40".
Center Of Anode To Cathode 4".
Tank Diameter 54"; Depth 14".
3/32" Koroseal Lining.
Solution Capacity 115 Gals. 2"
From Top.
Anodes: Flat 16 lb. 6% Antimonial
Lead—Outer 1/4"x9"x7/8"; In-
ner 1/4"x9"x4/4". Anode and
Cathode Tags 1/4" x 2". Copper
Bars.
Bused For 500 Amps.
Heating (Standard): 1/4" I.D. 6%
Antimonial Lead Steam Coil.
(Available For Electric Heating.)
Drive: 1/4 HP 110/220 1- Phase
60 Cycle AC Motor. Variable
Speed Reduction.

Save Money! Reclaim Your Valuable Wastes!



Typical CATEXER® ANEXER® Ion Exchange Plant

New ion exchange techniques using "CATEXER" "ANEXER" plants make it practical to recover valuable chemicals and rinse waters in some cases. Only careful evaluation will show whether recovery methods, or treatment by oxidation, reduction or precipitation is more economical. INFILCO manufactures all types of waste treatment equipment and can offer impartial evaluation of your problem. Write for complete information.

- Low installed cost
- Minimum space requirement
- Chemical recovery
- Demineralized rinse water
- Simplified waste disposal



The ONE company offering equipment for ALL types of water and waste treatment—coagulation, precipitation, sedimentation, filtration, flotation, aeration, ion exchange and biological processes.

INFILCO INC.

912 South Campbell Ave., Tucson, Arizona
Field Offices throughout the United States and 5539
in Foreign Countries.

Unequalled barrel finishing ...with 4 different TUMBLEX* abrasives

Here are vital steps that will give you exactly the results you're looking for on deburring, descaling and finishing your products.

One is to switch from out-of-date tumbling or off-hand methods.

The other is to check Norton Tumblex materials and learn which, together with modern barrel finishing techniques, make the best combination to meet your particular requirements.

The long, expert experience of Norton engineers in developing Tumblex abrasives has brought the value-adding, cost-cutting "Touch of Gold" to barrel finishing of the widest range of products. To you, this means prompt aid in solving finishing problems. Just send sample parts, ranging from tiny needles to hefty forgings, to the Norton Sample Processing Department. You'll get helpful recommendations as to the type and size of Tumblex material to use — plus other data on the tumbling barrel equipment and operating methods you need most. **Or write, to Norton Company, Worcester 6, Mass.** for a copy of the newly revised handbook on barrel finishing. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

G-323

NORTON
ABRASIVES

*Making better products...
to make your products better*

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-cat Tapes

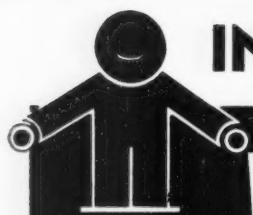
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

ALUNDUM* Tumblex "S". Newly developed bonded spheres that easily get into areas where other abrasive shapes can't reach. Exceptionally dense and long lasting, for top barrel finishing in many applications. In five different sizes.

ALUNDUM Tumblex "T". Bonded, triangular shape, and fast cutting for special shaped parts. Triangular form prevents wedging in work slots or holes. Available in four sizes.

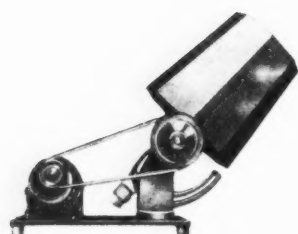
ALUNDUM Tumblex "A". The workhorse for general barrel finishing. Performs several operations at once, removing flash, scale, tool marks and burrs, while forming radii and finishes to required microinch. Made in eleven sizes.

Tumblex "N". Natural stones, offered exclusively by Norton, for high lustre, especially on die castings and soft metal. Rounded uniform shape brings out the most desirable color of finished parts. In seven sizes.

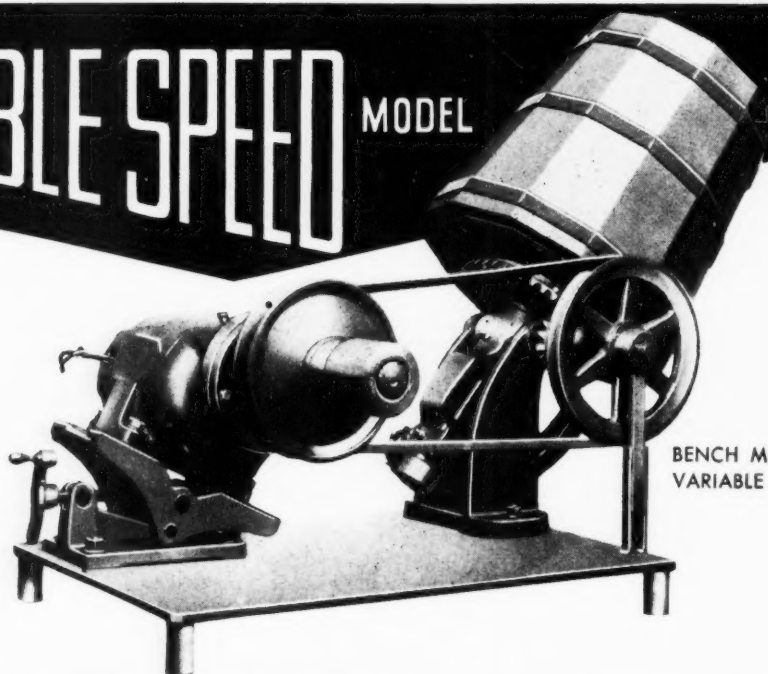


INVESTIGATE THIS TIME - SAVING

VARIABLE SPEED MODEL



Bench-Type Single Speed



BENCH MODEL
VARIABLE SPEED

Note Carefully These IMPORTANT POINTS

Barrels can be filled with parts or abrasive — *while running*.

Work can be watched — samples removed for inspection — *while running*.

Angle can be changed for best abrasive or polishing action — *while running*.

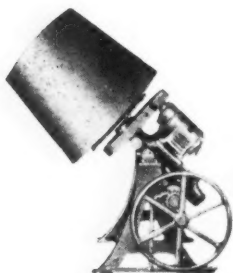
Barrels can be emptied by tilting to pouring position — *while running*.

Barrels are made in various sizes, shapes, and materials. They are easily replaced.

If You're a Tumbler, Send
for This NEW CATALOG

THE HENDERSON BROS. COMPANY
"The Tumbling Barrel People"

136 SOUTH LEONARD STREET
WATERBURY, CONNECTICUT



No. 6—Single Speed



No. 5A—Single Speed



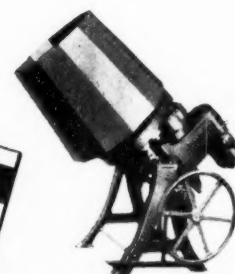
No. 5—Single Speed



No. 5—Variable Speed



No. 5A—Variable Speed



No. 6—Variable Speed



SINCE 1880 DESIGNERS AND BUILDERS OF TUMBLING BARREL EQUIPMENT





"Bill, why are you so sure Dow perchloroethylene will do a better job in my degreaser?"

"One big reason, Jess. Dow Perchloroethylene Industrial is tops in *stability*. Its resistance to breakdown and deterioration is as good as you can get."

"So what does it do for me?"

"Plenty. Cleans parts thoroughly the first time through. Eliminates rejects and reruns. Prevents damage to your degreaser and the parts—especially white metal parts."

"Think it'll remove that wax?"

"Sure will. Its higher boiling point gives parts a longer, more thorough cleaning before reaching the vapor temperature. It's real tough on those higher melting waxes."

"O.K., Bill, so it'll really clean. But is it safe?"

"You bet! No flash point and no fire point."

"All right. I'm convinced it's the best solvent for the job. Say, you sure know a lot about it."

"Not really. Dow people know more."

"Who?"

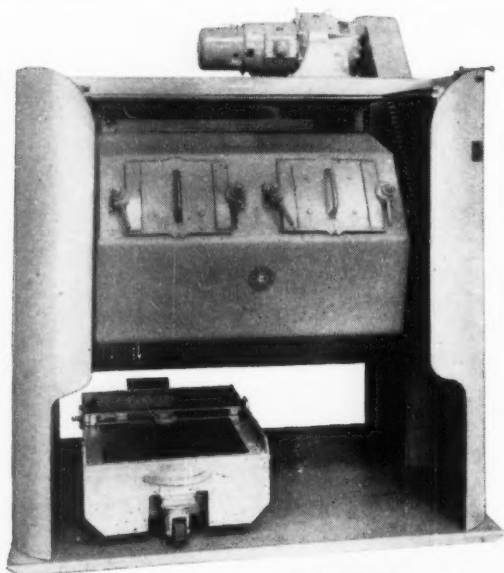
"Dow, The Dow Chemical Company, Midland, Michigan. The company that also makes Dow Trichloroethylene for vapor degreasing, Chlorothene® for cold cleaning, and Dow Methylene Chloride for stripping. Why don't you drop them a line?"

YOU CAN DEPEND ON

DOW

CROWN TUMBLE

DEBURRING EQUIPMENT

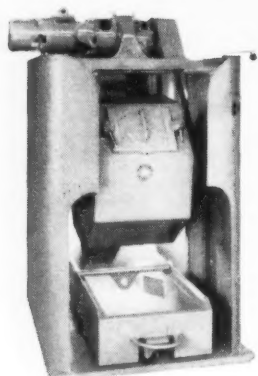


2 Compartment
Horizontal Tumbling Machine

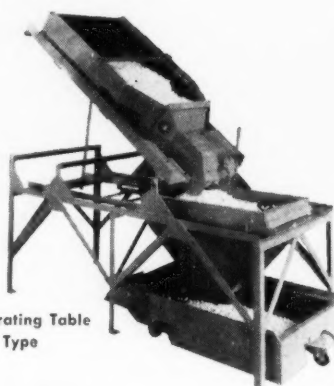
To deburr and tumble finish metal parts

Crown's complete line of newly improved tumbling machines and labor saving accessories provide huge savings in time-costs and labor.

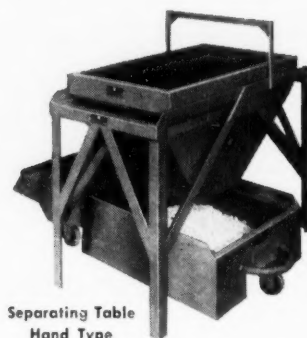
- Light weight — quick acting "seal tite" doors with easily replaceable gasket.
- Front safety guard.
- Forward and reverse switch to rock barrel in rinsing and to position doors for loading and unloading.
- Easily accessible motor and bearings.
- Rubber lined — Neoprene lined — unlined.
- Special machines designed and built



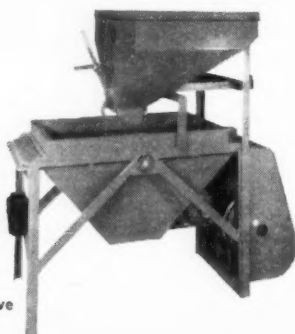
Single Compartment
Horizontal Tumbling Machine



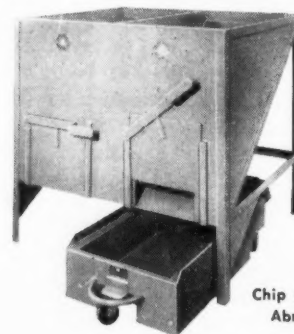
Mechanical Separating Table
Hoist Pan Type



Separating Table
Hand Type



Separator — Motor Drive
with Hopper

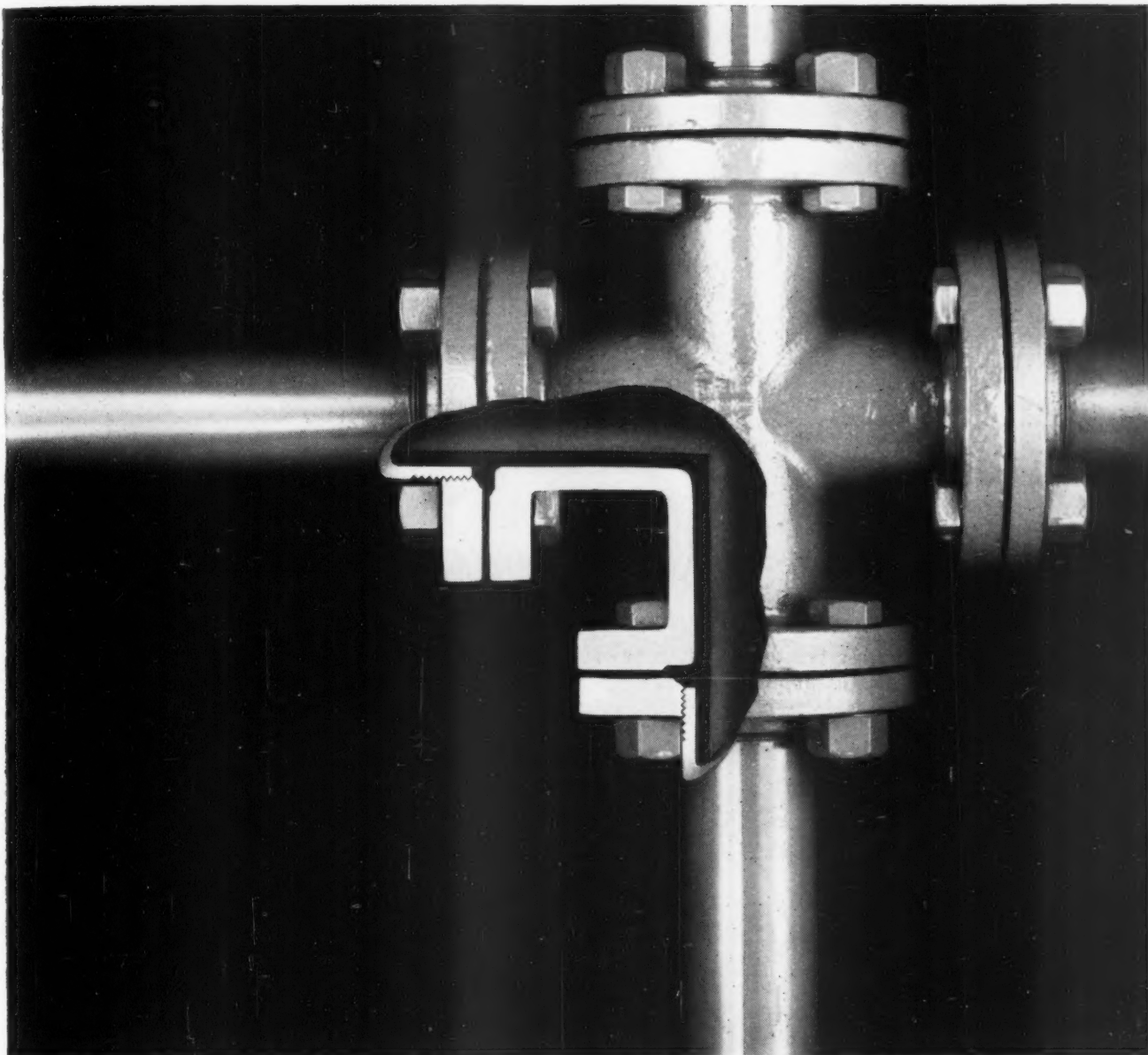


Chip or Tumbling
Abrasive Bin

WRITE FOR OUR COMPLETE CATALOG OF TUMBLING MACHINES AND ACCESSORY EQUIPMENT

CROWN RHEOSTAT AND SUPPLY COMPANY

3465 N. KIMBALL AVENUE • CHICAGO 18, ILLINOIS



Corrosive liquids flow from pipe through fittings or valves without touching metal in saran lined piping.

You can see why saran lined pipe stops shutdowns

It's corrosion-resistant saran locked within rigid non-bursting steel

By preventing corrosion, saran lined pipe can stop shutdowns—save labor costs and production loss.

Here is a pipe that resists commonly used acids, alkalies and many other corrosive liquids while having the strength of steel. It can withstand working pressures up to 300 psi. Cast iron and malleable iron fittings and valves are available for pressures up to 150 psi. If you have a high-pressure problem

in your operation, cast steel fittings and valves are available for pressures up to 300 psi.

You'll save labor costs, too, in fabrication. Saran lined pipe can be cut and threaded with conventional hand tools.

For tomorrow's protection today investigate saran lined pipe. THE DOW CHEMICAL COMPANY, Midland, Michigan.

SARAN LINED PIPE COMPANY
DEPT. SP1592C
2415 BURDETTE AVENUE
FERNDALE 20, MICHIGAN

Please send me information on saran lined pipe, fittings and valves.

Name _____ Title _____ Company _____
Address _____ City _____ State _____

YOU CAN DEPEND ON



Sourdough?



...OR *Real Dough!*

WHEN YOU SHIP US

NICKEL PEELING SCRAP

FROM YOUR PLATING OPERATION



WE'RE ALWAYS BUYING ALL
TYPES OF NICKEL PLATER'S
SCRAP ... AT TOP PRICES

FOR PROMPT QUOTATION SEND
US A 5-LB. REPRESENTATIVE
SAMPLE OF YOUR ACCUMULATION

INVOICE US FOR SAMPLE ... OR WE WILL PAY ON BASIS OF LABORATORY ANALYSIS

FOR A "SURE" THING ... *Phone . Wire . Write*

Stainless Steel Corp. of America

OHIO EDISON BLDG. YOUNGSTOWN 3, OHIO

Riverside 4-4123



* [SPE'CIAL·IST—One who devotes himself to some special branch of activity.]

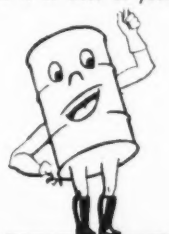
At Northwest our "special branch of activity" is solving your cleaning problems.

Remember — YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER.

Northwest's production-tested chemicals and "Right the first time" recommendations will save you money. Northwest Service is as close as your phone.

Behind your friendly, competent Northwest Sales Engineer stands a reputation for providing industry with low-cost, analytically-correct, job-adjusted chemical cleaners.

From Northwest's years of experience in formulating the RIGHT cleaner for your specific needs have come such developments as the LO-HI pH PROCESS—for cleaning prior to plating, painting, or vitreous enameling; ALKALUME PROCESS—for preparing aluminum and magnesium for finishing and spot welding; INTERLOX PROCESS—for phosphate coating; SPRA-LUBE—to control over-spray of "to-day's" paints in water wash paint booths; PAINT STRIPPERS—specific to your needs; SUPER-DRAW & FLUID FILM—for drawing metals.



NORTHWEST CHEMICAL CO.

9310 ROSELAWN

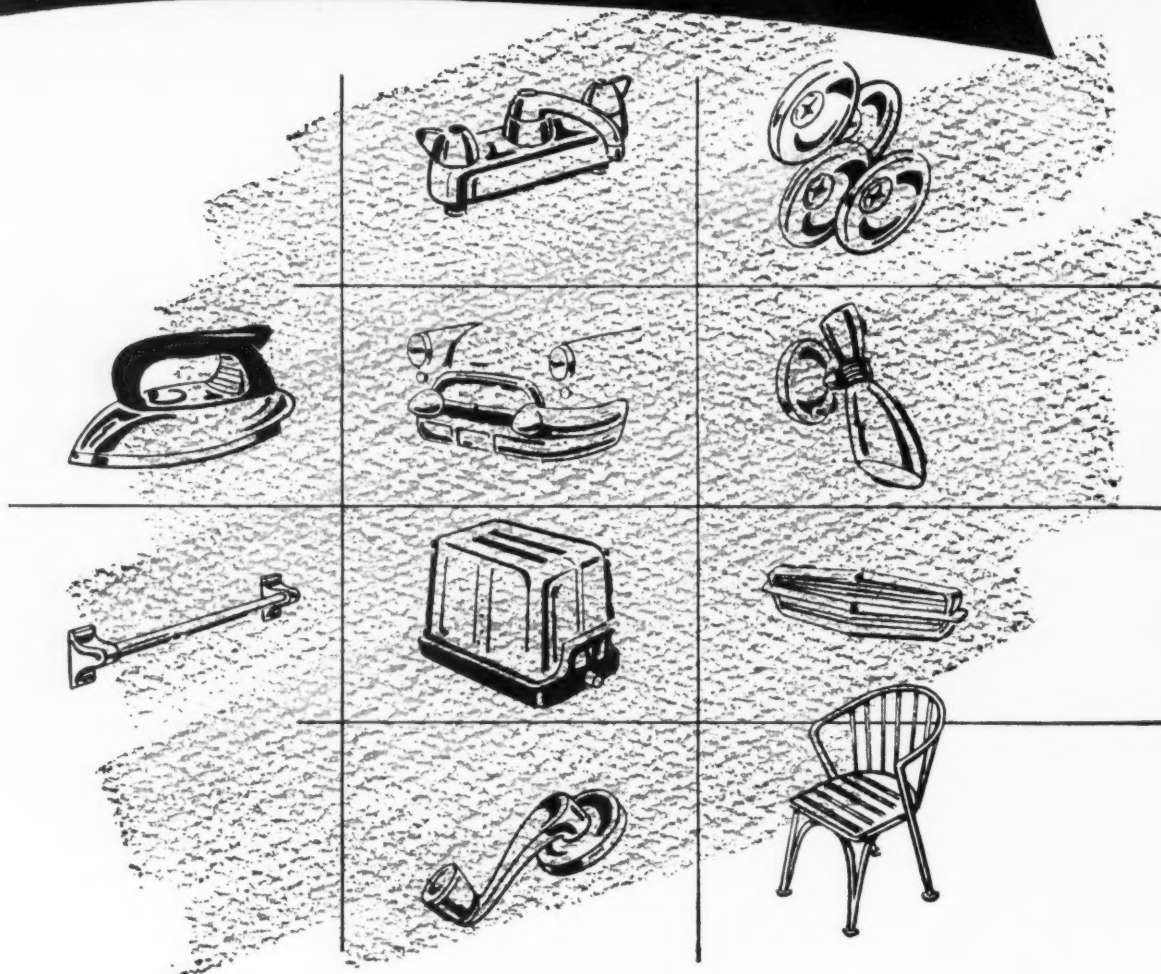
DETROIT 4, MICH.

pioneers in pH cleaning control

serving you since '32

HARSHAW Nubrite

**long, bright nickel plating
operation without treatment**



Other outstanding advantages are:

BRIGHT OVER WIDE RANGE

from a few amperes/ft.²
to well over 100 amperes/ft.²

HIGH TOLERANCE to common impurities

HIGHLY RECEPTIVE to chrome

EXCELLENT LEVELING

BETTER BRIGHTNESS with thinner deposits.

SIMPLE OPERATION and CONTROL

Plates brightly from 120°F to 155°F.

pH can vary over a wide range

Liquid addition agents.

**REMAINS DUCTILE AFTER LONG
OPERATION**

For additional information contact the Harshaw office nearest you.

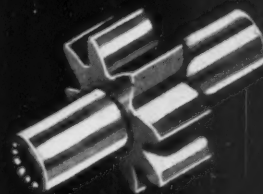
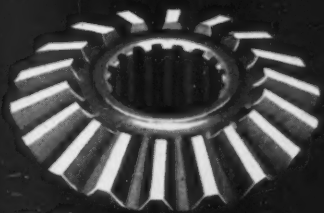
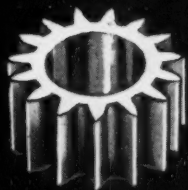
THE HARSHAW CHEMICAL CO.

1945 East 97th Street • Cleveland 6, Ohio

Chicago 32, Ill. • Cincinnati 13, Ohio • Cleveland 6, Ohio • Houston 11, Texas

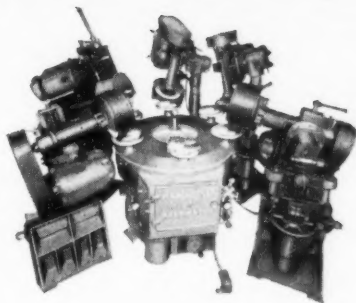
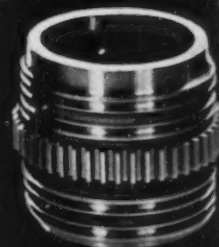
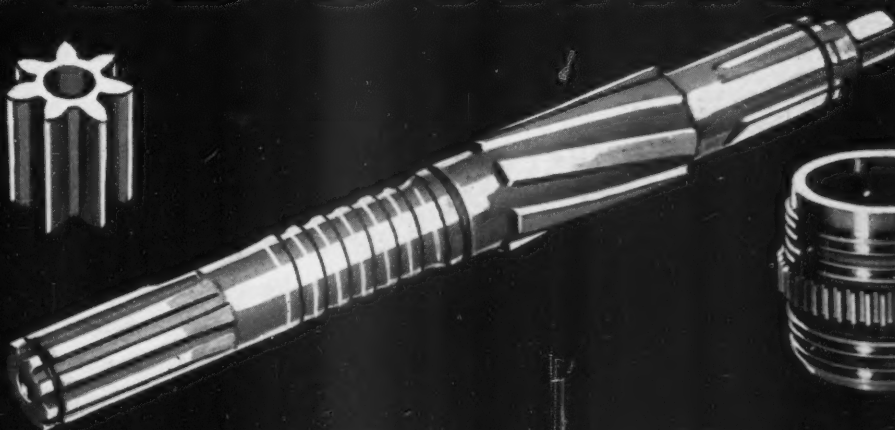
Los Angeles 22, Calif. • Detroit 28, Mich. • Philadelphia 48, Penna.

Pittsburgh 22, Penna. • Hastings-On-Hudson 6, N. Y.



Hammond
of Kalamazoo

HEADQUARTERS FOR
DEBURRING



Hammond Automatic Deburring Machines will increase production, assure a uniform finish, reduce operator fatigue and save floor space.

Send sample parts for complete engineering report.

Hammond Machinery Builders
INC.

1601 DOUGLAS AVE.

KALAMAZOO, MICH.

NEW

...from Du Pont

Improved "Zin-O-Lyte" Brightener Saves Money in Barrel Plating Zinc

NEW "ZIN-O-LYTE" BRIGHTENER SPECIAL

**Gives brilliant zinc deposits...right
from the barrel...without a bright dip**

NOW YOU can get top quality, brilliant zinc plating direct from the barrel without a bright dip, by using "Zin-O-Lyte" brightener—SPECIAL. The new formulation, fully tested in production installations, is designed specifically to cut your brightener costs with no sacrifice in quality of work.

"Zin-O-Lyte" Brightener SPECIAL is compatible with other Du Pont zinc brighteners and generally can be used without change in procedure.

The new "Zin-O-Lyte" brightener is available in non-returnable Fibrepak drums which minimize breakage . . . reduce shipping costs. This readily soluble powder also gives you freedom from freezing or settling out of brightener constituents in storage or transit.

New "Zin-O-Lyte" Brightener SPECIAL is a part of Du Pont's extensive line of plating chemicals. For complete information and arrangements for trial use in your plant, please call or write to our nearest district office or: E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Del.

DISTRICT SALES OFFICES: Baltimore • Boston
Charlotte • Chicago • Cincinnati • Cleveland • Detroit
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DU PONT *Chemicals • Processes • Service*
for **ELECTROPLATING**



BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

WAGNER ISO-BRITE COPPER . . .



"The efficiency of your new Iso-Brite Copper bath will enable us to put a \$7500 'semi' to work on other jobs. We get a deposit of .0005" in a 15 minute cycle and could easily get .0006" to .0008" if required. Iso-Brite needs less maintenance than any bath within our experience." (Robert Hilfinger, Pres. Hilfinger Corp. to Jos. R. Wagner.)

doubles

Die cast automotive grill part ready for nickel and chrome.

SEMI-AUTOMATIC PLATING!

CONVERSION TO ISO-BRITE ELIMINATES ONE MACHINE . . .

The record at Hilfinger Corp., Toledo, Ohio, tells a simple story. This big, 115,000 sq. ft. die casting plant with a 200-man plating department originally required two semi-automatic plating machines for plating copper before nickel and chrome on large automotive die castings. New Wagner Iso-Brite Copper bath was installed eight months ago in one tank, replacing a leading proprietary copper bath, both machines being operated by a single generator. Excessive burning of the competitive plate resulted. The single machine charged with Wagner Iso-Brite Copper now turns out Hilfinger's entire production requirement to the customer's specification, permitting the surplus semi-automatic to be devoted to other production.

If reducing finishing costs is of interest to you, consider these reasons why this new Wagner-processed chemical is making records everywhere:

Wagner Iso-Brite Copper offers

1. Ease of control
2. High anode efficiency—copper cyanide additions virtually eliminated
3. Much heavier plate
4. Fine grained, dense, ductile, fully bright
5. Freedom from roughness
6. Wide operating range—temperature 135-165°; up to 60 amperes per square foot
7. High tolerance of organic contamination

Wire, phone or write for Bulletin 70.2 for full technical information on Iso-Brite Copper and the Wagner cadmium and zinc brighteners and chromate finishes. Please pass this advertisement along to your purchasing agent or plating superintendent. The Wagner man in your area will assist you with any plating problem.



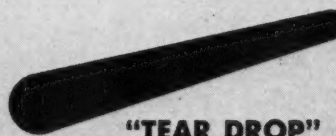
400 MIDLAND AVE., DETROIT 3, MICHIGAN
CHICAGO • CINCINNATI • CLEVELAND • INDIANAPOLIS • NEW YORK • ROCHESTER • GRAND RAPIDS

Wagner
BROTHERS INC.

NEW SHAPED, EXTRUDED APW SILVER ANODES



"RECTANGULAR"



"TEAR DROP"



"DOG BONE"

STANDARD
SHAPES



ROLLED FLAT PLATE
ANODE SECTION:

This Photomicrograph shows highly irregular, uncontrolled grain size—a major cause of shedding and resultant rough electrodeposits.



APW EXTRUDED
ANODE SECTION:

Small, fully controlled regularity of grain size promotes uniform corrosion, smoothest electrodeposits, less rejects.

CONTROLLED GRAIN SIZE: APW EXTRUSION PROCESS*

controls grain size within definite limits — minimizes sheddings
These scientifically shaped anodes retain 80% of original active surface area after 85% by weight has been plated off!

Costs are lowered by prolonged anode life, minimized polarization and less silver scrap to be refined.

In addition, the APW Extrusion Process controls grain size within definite ideal limits so that corrosion is smooth and uniform. Electrodeposits are *consistently* smooth. Shedding is virtually eliminated. Rejects are a comparative rarity!

We are anxious that the silver you buy in anodes is used most efficiently and economically. Special anode shapes will be engineered to meet your particular plating bath conditions. Call or write for a representative. We'll be glad to assist with your plating problems.

*Pat. Pending

THE AMERICAN PLATINUM WORKS

231 NEW JERSEY RAILROAD AVENUE • NEWARK 5, NEW JERSEY

ENGELHARD INDUSTRIES



LOW COST

THINKER BOY Plating Racks
Reduce racking costs — tremendously!

NO WAITING

No Make shift Racks —

You don't have to use inefficient racks to get work out on time. With THINKER BOY you can assemble racks designed for the job and be in production over night.



Just drill holes to install tips or join frame members—insert studs—draw nuts tight—install sealing caps.

REDUCED COSTS

With THINKER BOY, rack designing is easy and fast—No sketching—No drawing—Just lay out the THINKER BOY Members and Tips with the work you have to plate. You can make a sample rack in minutes. Develop highest racking efficiency for lowest racking costs.

NOW ONLY

\$ **2**⁷⁸

Insulated Thinker Boy TBUA Spines

24" — \$2.78
30" — 2.95
36" — 3.12

TBUA

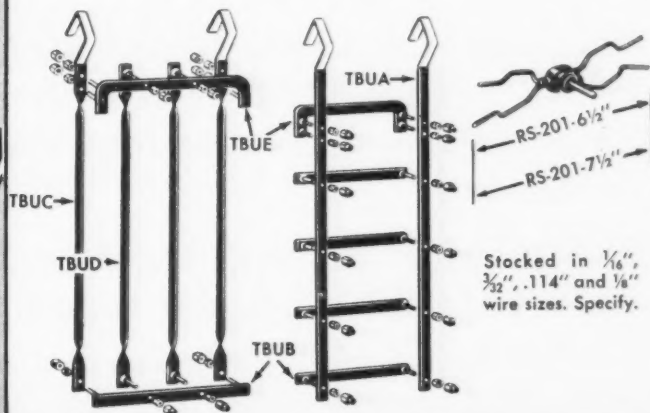
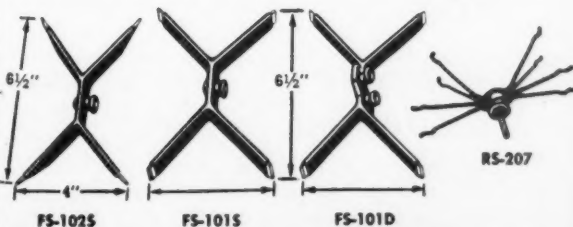
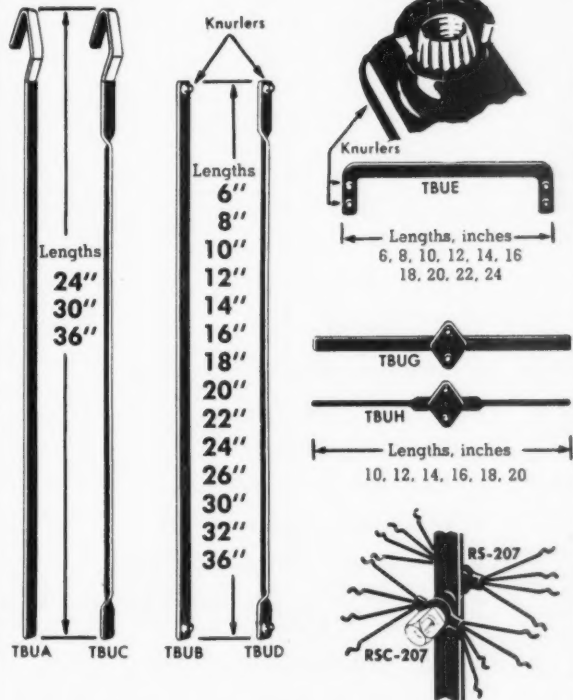
TBUC

FLEXIBILITY UNLIMITED

With THINKER BOY a broken or damaged tip doesn't ruin or tie-up the rack. You can replace THINKER BOY Tips right on the job in a jiffy.

When a job is all through, finished, THINKER BOY Racks do not become worthless like other racks. You can change the tips or tip spacing for efficiently plating other work, or disassemble and use the parts in other racks.

With THINKER BOY Rack Members you can assemble single, double, triple or quadruple spine racks, cross bar, and T racks in a wide range of sizes to the spacing you want.



Stocked in 1/16", 3/32", .114" and 1/8" wire sizes. Specify.

Send for the THINKER BOY Instruction Manual. See how simple it is to assemble completely insulated racks of your own design. Check the great variety of THINKER BOY Tips. The more you think about THINKER BOY the more you will save.

Belke MANUFACTURING CO.
947 N. Cicero Ave.
Chicago 51, Ill.
EVERYTHING FOR PLATING PLANTS

cut operating COSTS

of bright chromate conversion coatings on zinc

with **KENVERT 17-A**

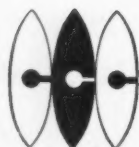
This product is of specific interest to those manufacturers making their own bright dips as we can offer savings to 75%.

If you need a white full deep polish — specify KENVERT #16 — which is also a powder requiring no leach.

For cadmium platers: Investigate KENVERT #27, a powder requiring no leach.

Complete distribution throughout Industrial Areas.

- No leach
- Low concentrations (2-3% solution)
- High corrosion protection (in excess of 40 hrs.)
- No waste disposal problem of rinse waters.
- Excellent brightness
- Chrome color
- Operate cold
- Simple to operate and control
- Easy to replenish
- Good solution life
- Operates 5-50 secs. dip
- Minimum metal removal
- Low rinse water consumption
- Powder — no returnable containers (no freight on water)
- 3-5¢/gal. treating solution



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CHEMICAL
CORPORATION**

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invited on
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letterhead.*

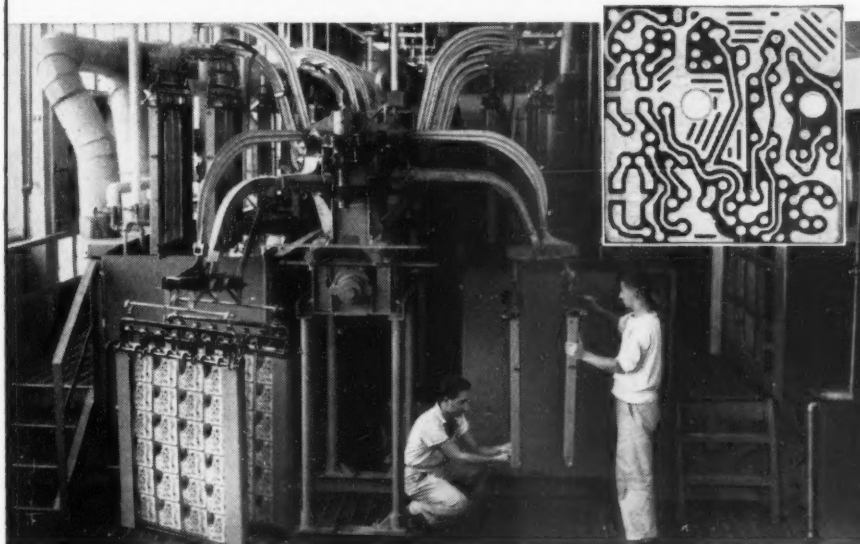


THE FINISHING TOUCH

A. B. HOEFER, Vice-President, FREDERIC B. STEVENS, INC.

STEVENS MACHINE SPEEDS PRODUCTION OF PLATED CIRCUITS

POSSIBLY ONE OF THE BIGGEST TECHNOLOGICAL ADVANCES in methods and materials for the assembly of electronic equipment is proving to be electrically conductive lines of copper, plated to uniform thicknesses on a plastic circuit board. Stevens is proud to be playing a part in this advancement. ONE LARGE MANUFACTURER IS OBTAINING 2,880 PLATED CIRCUITS an hour with a Stevens Automatic Rack Type Processing and Plating Machine. The machine carries two



Stevens Automatic Processing and Plating Machine used for copper plating circuits at General Electric Company, Auburn, New York.

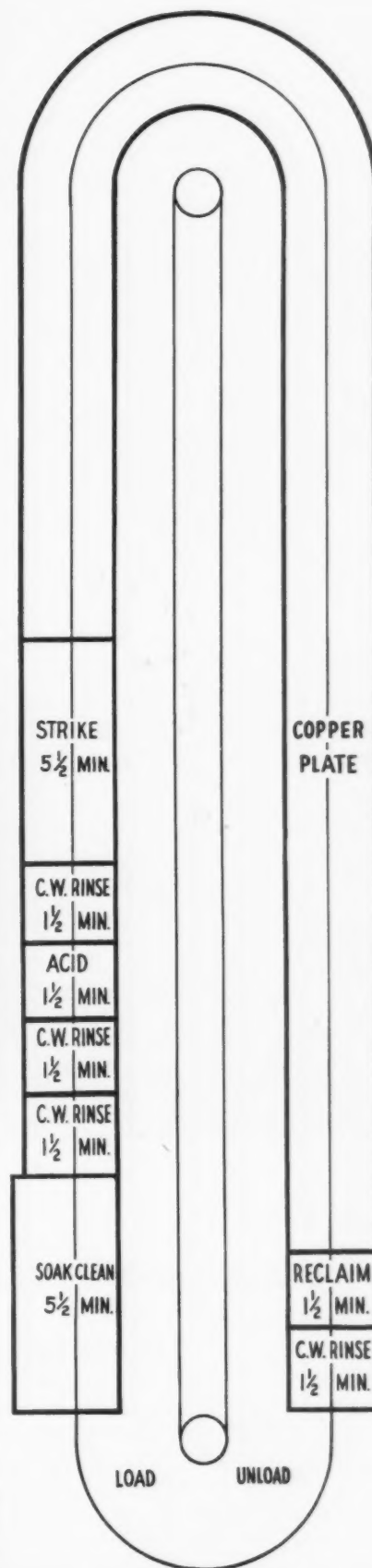
racks per arm, with each rack holding twenty-four circuits in position for plating. The results, beside the high production, are uniformity and "sure-fire" conductivity.

ANOTHER ADVANTAGE OF THE PLATED CIRCUITS is the "plated through" holes or eyelets which form a mechanical bond to the circuits on both sides of the base and also eliminate connective wiring of the two circuits.

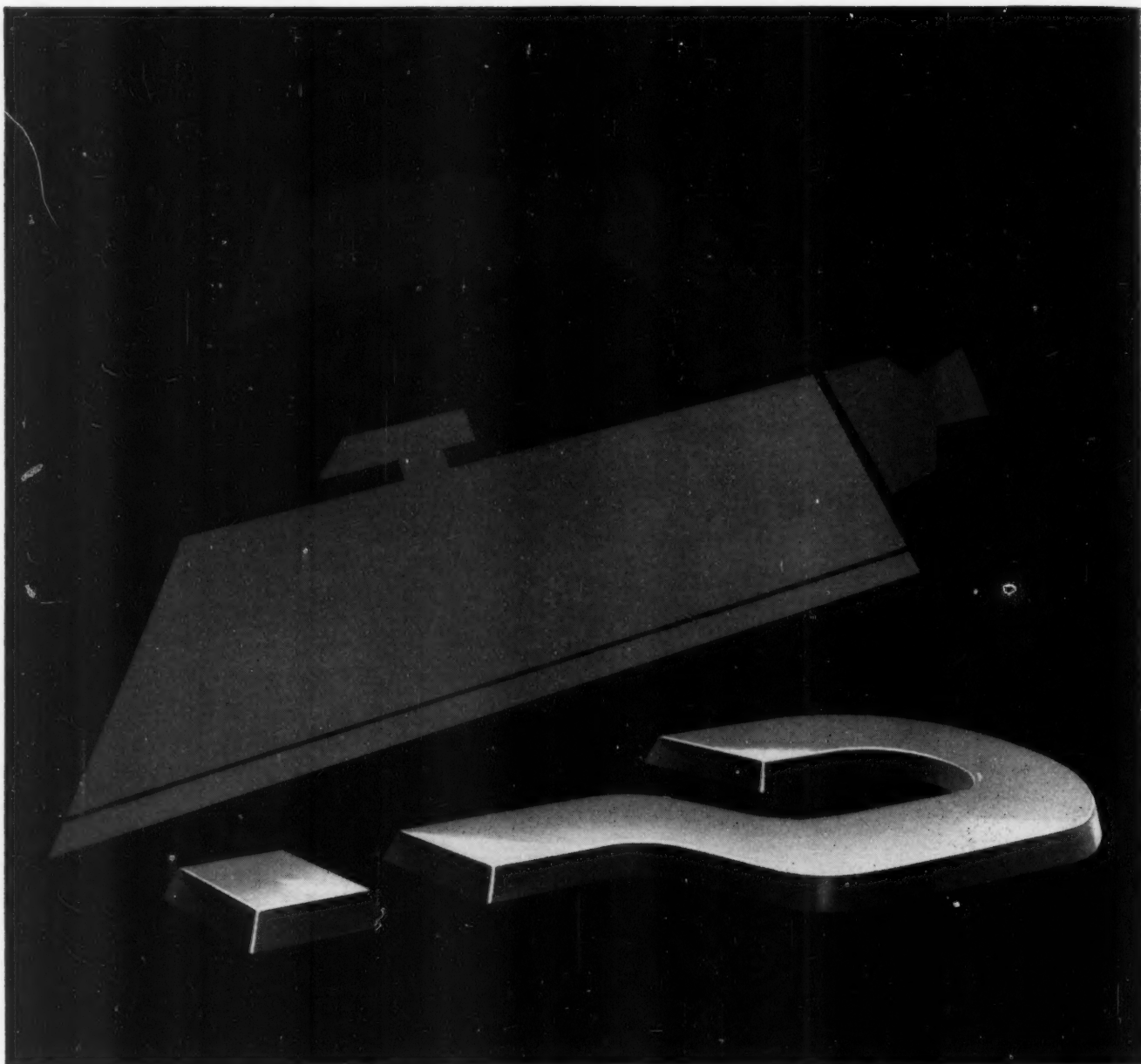
Our engineers are constantly working toward the development of new ideas in plating and metal finishing. Why not let us help you in such problems as plating, anodizing, pickling, cleaning, electro-cleaning, phosphating, stripping, lubrifying and other types of immersion processing. Write Frederic B. Stevens, Inc., 1804 Eighteenth Street, Detroit 16, Michigan.



WAREHOUSES AND OFFICES IN PRINCIPAL CITIES



Suggested cycle for automatic plating or forming of plated circuits.



Iron out your chrome-plating problems with Diamond

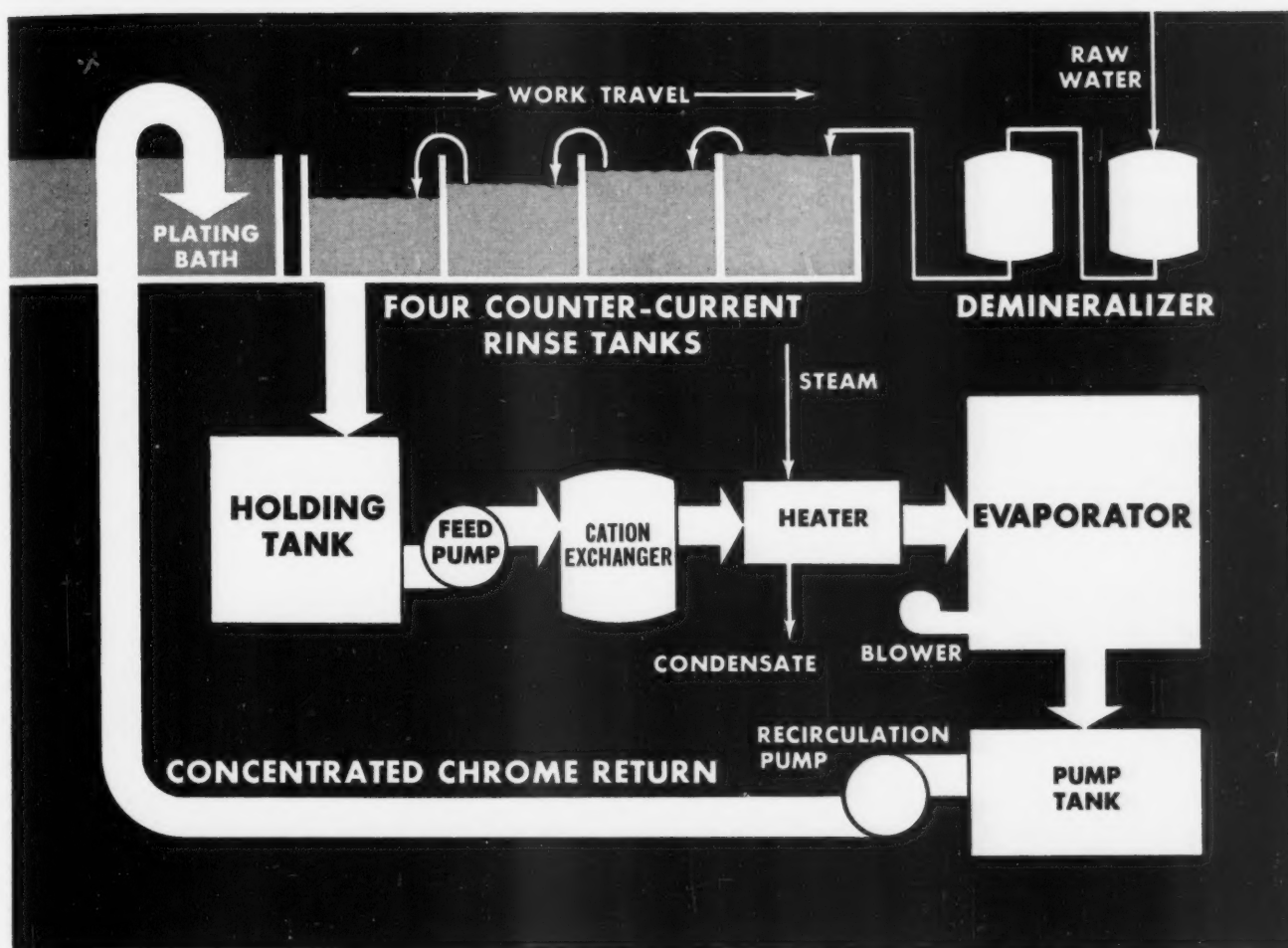
Let DIAMOND's technical specialists go to work on your chrome-plating problems. These men work full time on customers' questions. They come up with complete, profit-making answers. Their service is free.

In producing chromic acid, DIAMOND controls *every* processing step to safeguard quality. DIAMOND experience starts with importing the chrome ore and making the soda ash, and extends through production and delivery. It even includes standing by your side, if you wish, to help you get top-quality plating results and keep costs low.

DIAMOND facilities—two chromic acid plants and nine warehouses and sales offices across the country—assure you uninterrupted supply and dependable service. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.



Diamond
Chromic Acid



Chromium recovery costs less than destruction!

Designed for a large auto manufacturer, this Industrial Chromic Acid Recovery System was carefully analyzed for operating costs, including labor, power and amortization. When compared with a destruction system of equal capacity, **Industrial's system shows a net daily GAIN of \$26.65 against destruction COSTS OF \$54.06***

How Industrial engineered the system

After a thorough analysis of the entire plating operation, Industrial engineers recommended that the rinse water flow rate be reduced. When this was done, rinsing was still

*See article "Profitable Recovery of Plating Wastes by Reconcentration of Reduced Volume Rinses"—Odlund & Hesler. *Plating*, August, 1956. Reprints are available of this paper by two Industrial engineers.

efficient and complete with less than 4 ppm acid concentration in the final tank . . . but the higher concentration in the first tank made it possible to use a fast, convenient evaporator to recover chromic acid. No pre-concentration was needed (the small cation exchanger only removed metal contaminants). Industrial then planned and built the entire system including tanks and pumps.

We hope you noticed the key words . . . "thorough analysis" in the paragraph above. This is typical Industrial engineering—and at the auto plant it led to truly impressive gains in plating efficiency and economy. Why not use this kind of service yourself... **To solve your plating problems call Industrial . . . and work with the men most experienced in the industry at handling plating solutions—all along the line.**



Send for complete data . . .

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FILTER & PUMP MFG. COMPANY
5906 OGDEN AVENUE • CHICAGO 50, ILL.

Please send me literature and reprints of articles on plating waste disposal.

NAME _____ TITLE _____

COMPANY _____

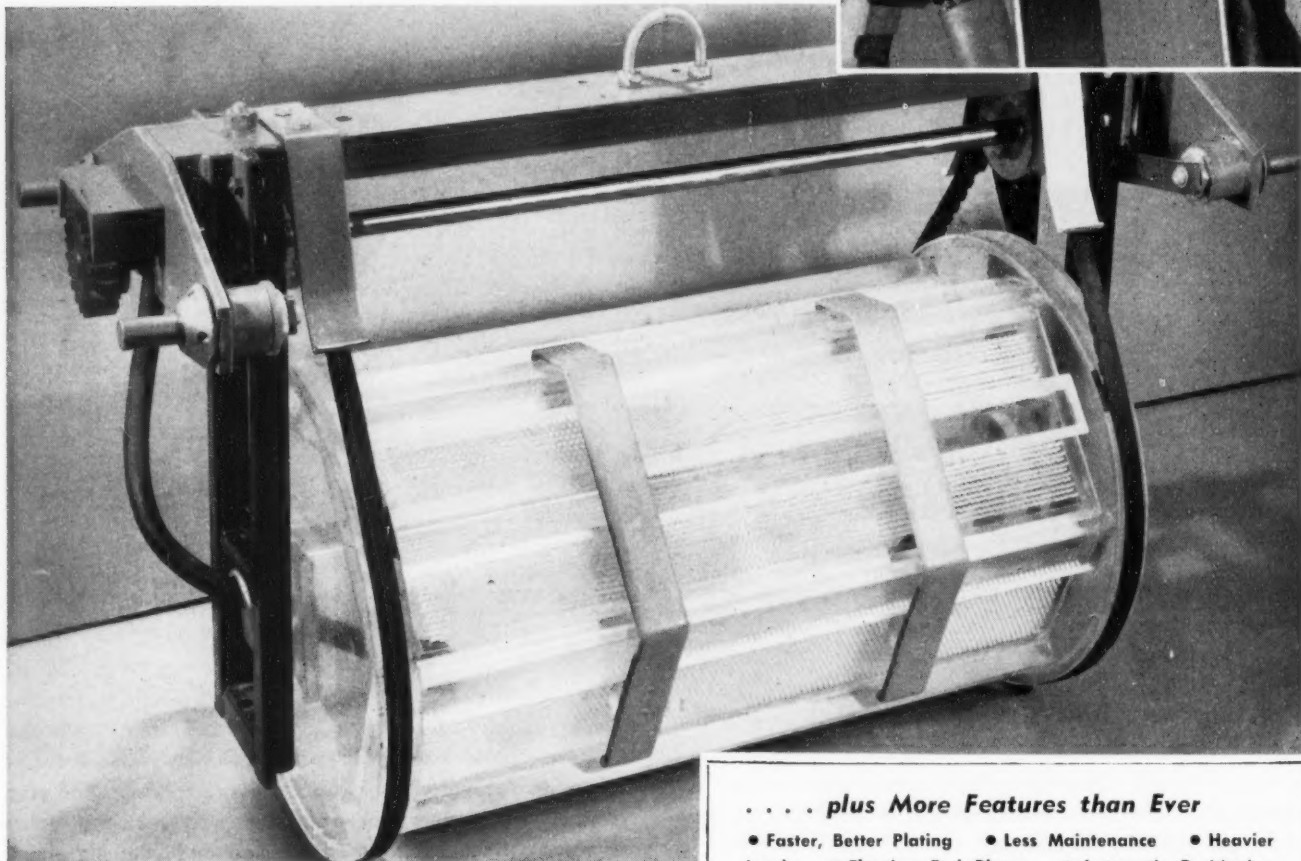
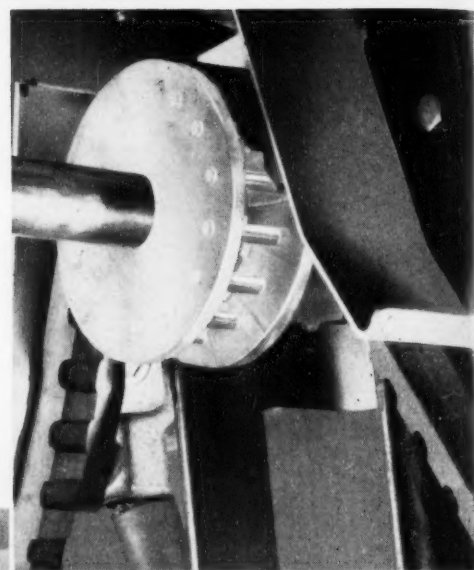
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Perfected: *all the new features*
Proved: *in hundreds of plants*
Patented: *U.S. Pat. 2,562,084...*

and other patents applied

for Your Protection!



G-S "Cogged-V-Belt" Drive Plating Barrel

Again G-S proves to be years ahead with all the **important** plating barrel developments — which mean **Greater Savings** for you. They're Patented to protect you against untried equipment — frantic "make-shifts" which are dangerous gambles at best. Today, G-S "Cogged-V-Belt" Drive Plating Barrels are out-performing, out-earning all others everywhere. "The Belt-Drive with the Gear-Grip" is another of the long list of G-S "firsts" which have set new, high standards for plating equipment. **Saves 100% gear maintenance!** Eliminated are cylinder end drive-gear, idler gear,

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pinion gear, 3 bearings. No gears or bearings in solution. Cogged-V-Belt can't slip, creep, or vary speed. Steel tensile members won't stretch. Belts resist acids, alkalis, floating oil and grease. Look into the G-S Conversion cylinder and superstructures for YOUR tanks. They cost **less** than you think, and will **pay their own way in savings**. Send for Bulletin GSB102.

THE G-S EQUIPMENT CO.

15585 Brookpark Road Cleveland 11, Ohio Clearwater 2-4774

METAL FINISHING, April, 1957



Do heating coils in your vapor degreaser often get gummed up like this? You may be using a degreasing solvent that's poorly stabilized. Read below how you can minimize this coil-cleaning job, and degrease more parts between cleanouts.

Why Nialk® TRICHLORethylene with **psp** gives you more degreasing, less downtime

Cut your degreasing costs with this permanently stabilized solvent

It's the *stabilizer* in the trichlorethylene that determines how long you can use it safely and efficiently.

Light, heat, air, acids, and active metals such as aluminum, given time, can break down improperly stabilized trichlorethylene, making it unfit for further degreasing.

Only Nialk

TRICHLORethylene has **psp**

The stabilizer in NIALK TRICHLORethylene has **psp**—permanent STAYING power. It's neutral, non-alkaline. You *never* have to replenish it.

Only NIALK has this *permanent staying power*. Even after repeated distillations, its unique stabilizer prevents acid formation and other causes of breakdown.

NIALK works equally well with *all* metals.

psp means cheaper degreasing—here's why

You don't have to clean out your degreaser nearly so often with NIALK TRICHLORethylene. You can degrease many more parts between cleanouts.

The NIALK stabilizer actively retards formation of degradation products in your degreaser. Cleanouts are easier, faster.

Get proof of Nialk's cheaper, safer cleaning

See for yourself how NIALK TRICHLORethylene with **psp** stays stable, keeps cleaning efficiently long after other solvents have lost their punch. Write on your business letterhead for a revealing resumé of comparative metallurgical tests on five leading brands.



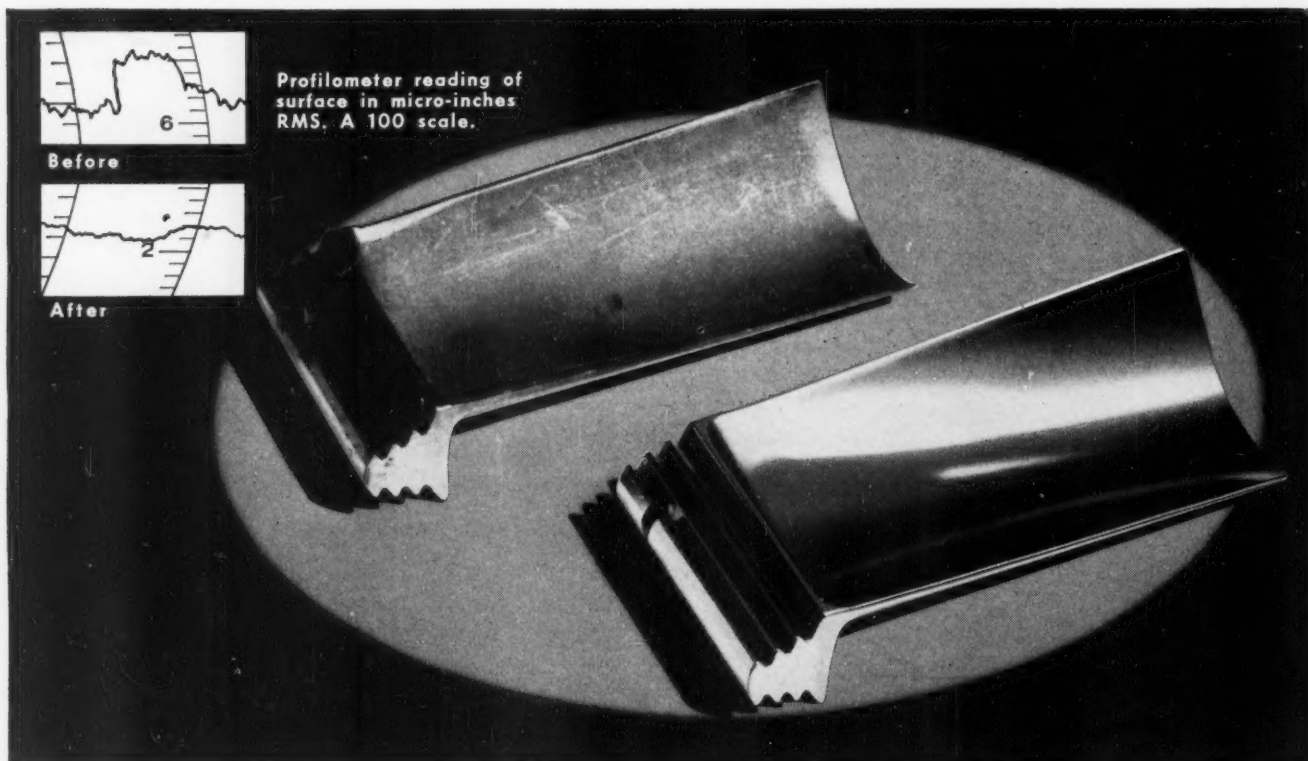
6-1609

HOOKEE ELECTROCHEMICAL COMPANY

1304 UNION STREET, NIAGARA FALLS, N. Y.

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Manufacturers of VIRGO® DESCALING SALT, VIRGO ELECTROLYTIC SALT, VIRGO MOLTEN CLEANER



Cut parts finishing costs, maintain exact tolerances, get absolute uniformity with *Roto-Finish* processes

Roto-Finish, pioneers in precision barrel finishing, offer you a complete finishing service. Savings on deburring, descaling, grinding, polishing, coloring and surface improvement are tremendous. Expensive hand finishing methods can be eliminated.

Roto-Finish processes are controlled to produce the finish you need with no significant dimensional changes. You get absolute uniformity of finish in quantity lots.

Many prominent manufacturers now using Roto-Finish processes are saving money on finishing costs. (Names on request).

ROTO-FINISH CHIPS, COMPOUNDS AND MACHINES ARE OF THE HIGHEST QUALITY

Roto-Finish has never sacrificed quality for the sake of price. Through the years, Roto-Finish has carried on a continuous program of process and product improvement to meet the needs of modern industry. When you choose Roto-Finish processes, you can be sure that you are getting the best in

supplies, equipment and complete continuing engineering service.

ROTO-FINISH GUARANTEES RESULTS

There is no costly trial and error involved in the purchase of Roto-Finish equipment. You submit unfinished parts to Roto-Finish along with a finished sample and a description of the finish you require. These sample parts are processed in the Roto-Finish Sample Processing Laboratories, where experienced engineers determine the combination of chips, compounds, and machine required to do the job. Roto-Finish guarantees to reproduce the same results in your plant, using the Roto-Finish processes, that are achieved in sample processing. This service demonstrates for you exactly what you can gain by using Roto-Finish processes.

The sample processing service is available to help you with your finishing problem. Take advantage of this opportunity to save on finishing costs. Send samples of finished and unfinished parts and details of the type of finishing equipment available in your plant.



SEND FOR THIS FREE TECHNICAL DATA FOLDER

It describes the basic process, chips and compounds and the complete Roto-Finish line of standard and special machines.

Roto-Finish

3706 Milham Road, Kalamazoo, Mich.



COMPANY

P. O. Box 988

Phone: FI 3-5578

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 ENGLAND — Roto-Finish Limited — Mark Road, Hemel Hempstead — Hertfordshire
 FRANCE — Societe Roto-Finish — 40-42 rue Chance Milly — Clichy (Seine) — Paris
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99.75

Chromic Acid

0 purity

CrO_3 99.75% MIN. SO_4 0.1% MAX.

When a commercial chemical runs 99.75% pure, the user need not ordinarily concern himself about the remaining 0.25%. In chromium plating, however, the 0.25% is important because it includes whatever sulfate is present.

While the maximum amount of sulfate permitted in Mutual Chromic Acid is only 0.1%, average production is well below that figure. Furthermore, the sulfate content varies but little from drum to drum. No other impurity exceeds 0.01%. The balance represents a trace of moisture which, of course, is harmless. This close attention to small details is one reason for the wide acceptance of the Mutual label wherever quality chromium plating is performed.



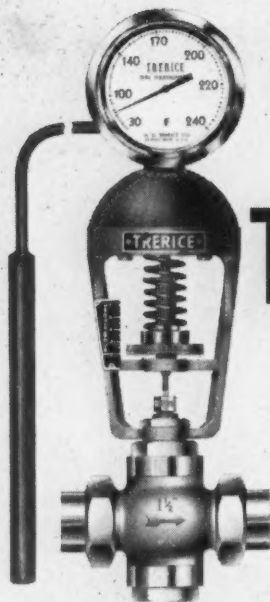
Sodium Bichromate • Chromic Acid • Potassium Bichromate



MUTUAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION
61 BROADWAY • NEW YORK 6, N. Y.





Why TRERICE Temperature Control

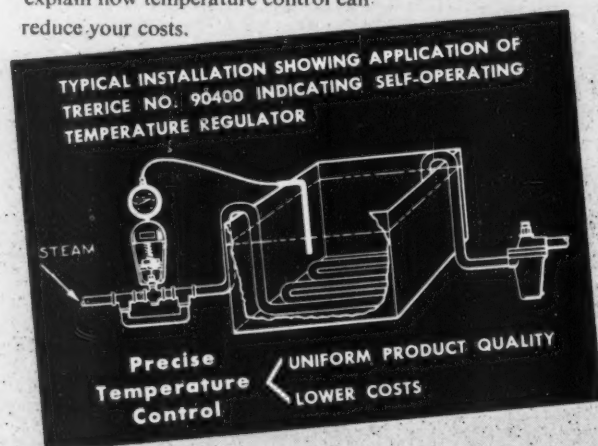
... in Plating and Metal Finishing Operations?

WHY temperature control? First of all, to assure uniform quality; second, to reduce processing costs.

Maintaining bath temperatures at the *one best level* used to be a serious problem. But not anymore. Today, TRERICE controls are automating plating processes throughout the metal finishing industry . . . maintaining precise temperatures *automatically*—TRERICE regulators prevent evaporation losses, cut down on rejects, insure uniform product quality! You save time, labor and fuel costs. Not surprising, then, that TRERICE controls are standard with leading original equipment manufacturers. Behind this wide acceptance is the TRERICE reputation for quality, and a nationwide sales and service organization.

The TRERICE line is a *complete* line. Each TRERICE temperature control installation is set up to meet the specific requirements of the user, insuring uniform product quality at the lowest cost.

If your operation involves cadmium, chromium, copper, nickel, tin or zinc plating; anodizing, bonderizing, cleaning, pickling or rinsing, it will pay you to have a "Trerice Man" explain how temperature control can reduce your costs.



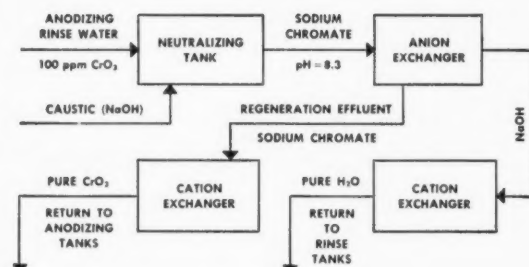
Send Today for Bulletin 803—TRERICE TEMPERATURE CONTROLS for the Metal Finishing Industries

H. O. TRERICE CO. 1424 W. Lafayette Blvd., Detroit 16, Mich.

Factory representatives in principal cities of U.S. and Canada

44/Circle on Readers' Service Card

ILLCO-WAY ionXchange



RECOVERY OF CHROMIC ACID FROM ANODIZING RINSE WATER

The block diagram above indicates one method of using ionXchange to save money, in the plating rooms of a large automobile plant, by recovering the chromic acid from the rinse tanks of anodizing operations. The cost of equipment was much less than the cost of a disposal plant, and the savings through recovery were substantial enough to make the investment a very profitable one.

REMOVAL OF ALUMINUM FROM ANODIZING BATH

A secondary purpose for one part of the same installation was the removal of aluminum from the anodizing baths. When the concentration of aluminum in any anodizing tank rose to nearly 1 g. per liter, that tank was cycled through the cation exchanger and the aluminum removed, thus saving over \$250 a week compared with partial dumping. *For details on this and many other money-saving applications of ILLCO-WAY ionXchange, write us or consult your Illinois Water Treatment Company representative.*

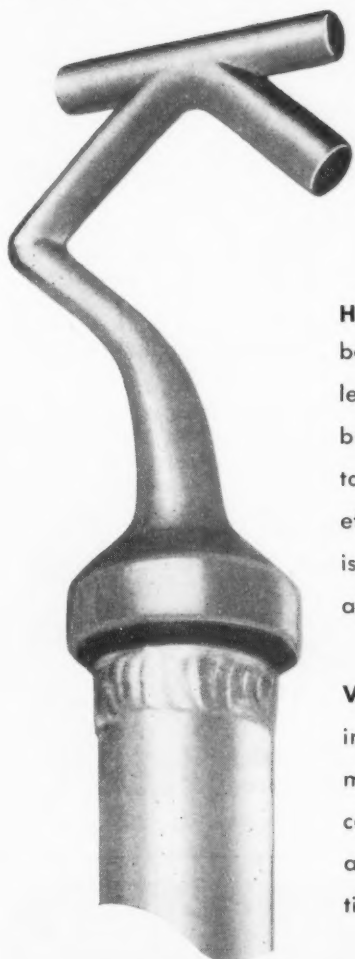
ILLINOIS WATER TREATMENT CO.
840 CEDAR ST., ROCKFORD, ILLINOIS

ILLCO-WAY ionXchange

NEW YORK OFFICE: 141 E. 44TH ST., NEW YORK 17, N.Y.
CANADIAN DIST. PUMPS & SOFTENERS, LTD. LONDON, ONT.

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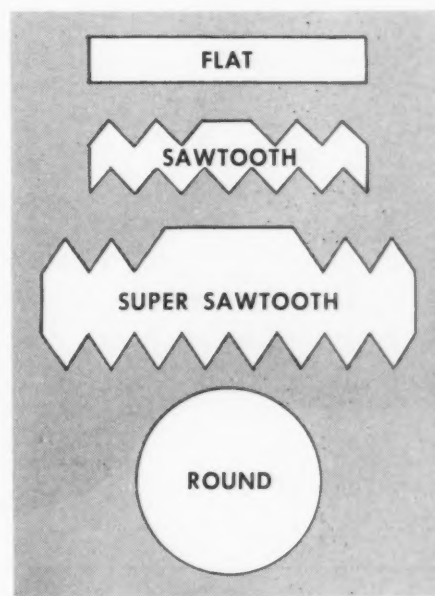
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RANGES OF SIZES AND STYLES**

HOMOGENEOUS BONDED HOOKS — The bond of the copper alloy hook to the lead stock, performed by skilled lead-burners, provides good permanent contact assuring maximum current flow and efficiency. The special bonding technique is incorporated with all styles of standard hooks.

VIRGIN METAL — The virgin metal used in all Heil Lead Anodes provides maximum service life and eliminates solution contamination and irregular premature attack possible as the result of impurities normally present in resmelted metals.



CROSS-SECTIONS OF STANDARD ANODES

ASSURED MAXIMUM CHROME PLATING BENEFITS

- FLAT
- ROUND
- SAWTOOTH
- HERRINGBONE
- SPECIAL SHAPES



CONFORMING TO YOUR
EXACT REQUIREMENTS



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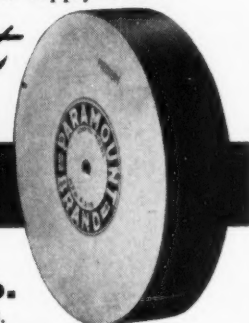


**with the PARAMOUNT
"Finishing Touch"**

"Fine finishes are essential to the sales success of our products," says L. E. Mason Co., leading manufacturer of quality gifts. "To highlight the copper plated and oxidized finish of the coasters, we depend on Paramount Felt Bobs. We get the precise color we want with no 'ragged highlighted ends' and without destroying contrast between the oxidized backgrounds and highlights. Your bobs give good cut, good life while producing the fine finishes we demand."

Wherever fine finishes count, successful firms use Paramount Wheels and Bobs. Join the leaders — specify Paramount. Call your supply house.

Paramount
Felt Wheels,
Bobs, Sheet Felt



Bacon Felt Co.
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Rhodium
ELECTROPLATING SOLUTIONS

Consult our staff, without
obligation, about your
specific plating problems.

Technological knowledge acquired through many years of experience, plus special processes and equipment, assure the high quality of our Rhodium Plating Solutions.

Recommended for contact surfaces of switches, wave-guide parts and other electrical applications; can be applied in extremely heavy deposits, where required, up to 100 milligrams per square inch.

Rhodium plating provides the advantages of whiteness, lustre and corrosion resistance of a precious metal.

SIGMUND COHN MFG. CO., INC.

121 SOUTH COLUMBUS AVENUE • MOUNT VERNON, NEW YORK



Specialists in the Unusual... SINCE 1901

Get the results you want from Wyandotte's Barrel-Finishing Compounds

BURNEK 22—Minimum running time gives exceptionally brilliant luster to brass, copper, nickel, silver and gold. Low cost, uniform results.

ALTREX®—For quick cleaning, cut-down, de-burring of steel, aluminum, brass, die castings. An economical, all-purpose de-burring compound.

BURNEK 452—Nonfoaming, free-rinsing combination cleaner-burnisher for steel, stainless steel; quickly develops high luster.

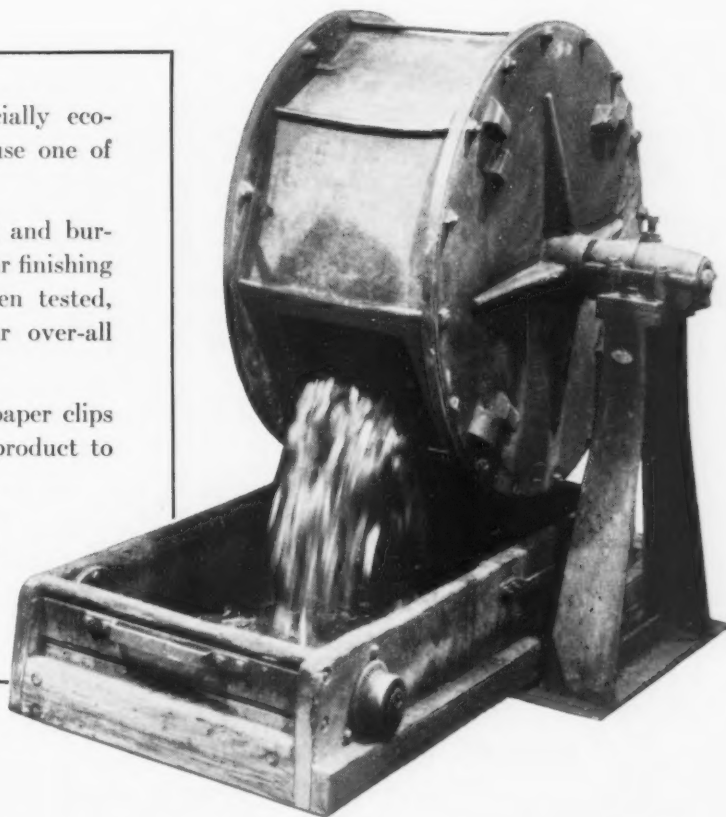
BURNISHING COMPOUND 321—Non-toxic brightening agent easily removes light tarnish; excellent for zinc, brass, copper, bronze, steel, stainless steel, gold.


A.E.—Powdered acid compound for brightening steel, stainless steel, brass, copper. Removes scale, rust, tarnish, spot-weld marks, flux from brazing operations.

BARREL FINISHING can be an especially economical way of finishing parts when you use one of Wyandotte's barrel-finishing compounds.

You see, Wyandotte produces de-burring and burnishing compounds to cover all phases of your finishing operations. Each of these products has been tested, proven in operation; each will lower your over-all costs through low use-costs.

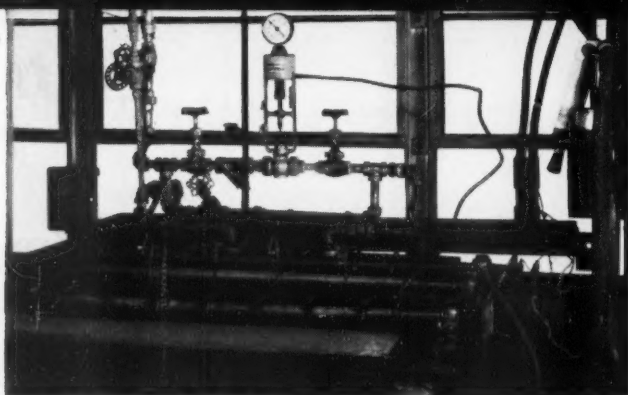
Whatever your finishing problem—from paper clips to zinc die castings—there's a Wyandotte product to solve it—efficiently, economically. Why not call your Wyandotte representative today. Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.



 **Wyandotte**
CHEMICALS

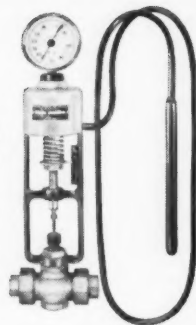
J. B. FORD DIVISION

The best in chemical products for metal finishing



PLATERS...

here's a sure way
to cut operating costs!
Install **AMERICAN
TEMPERATURE
REGULATORS**



Eliminate cloudy or rough deposits. Control deposit stress. Reduce rejects and consequent expensive reworking. Maintain constant color in alloy plating. Prevent breakdown of the solution. Maintain full throwing power. Stop overheating. Save steam.

All these advantages can be yours. Equip your metal finishing tanks with self-operated, automatic American Temperature Regulators. Temperatures are constantly maintained within required limits. You can be sure of continuously uniform, high-quality plating—no rejects. Where high-production conveyorized equipment is used, peak performance of the machinery is achieved.

American Temperature Regulators are available with an accurate temperature indicator as pictured here. Your men can tell immediately that required temperatures are being maintained. They can easily see and quickly reset the regulator when changing from one type of operation to another.

American Temperature Regulators are easy to select, install and maintain. No compressed air or electricity needed. Temperature adjustment and repeat setting take but a few seconds. *Sizes:* ½" to 1½". *Temperature Ranges:* 90/180° F. or 135/225° F. standard. *System:* Bulb and line of temperature system are covered with solution-resistant plastic, assuring long service life. *Valve:* Bronze body, single seated, with renewable stainless steel seat and disc. Screwed union ends. *Write for complete details.*



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YOUR INDUSTRIAL SUPPLY DISTRIBUTOR is as close as your telephone. Call him for experienced counsel, money-saving service and prompt delivery from local stocks.

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for that
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"Touch"



● Use Pentrate®...

the finest black oxide available at low cost with trouble-free operation. Produces jet black finish on all steel, regardless of composition or hardness.

Write for literature, send samples for treatment or give us your problems — our laboratory staff is available to help solve them.

A new folder describing the full line of black oxide finishes, chromate finishes, cleaners, oils, and strippers is yours for the asking.

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Springfield 1, Mass.

or 701 North Sangamon Street, Chicago 22, Illinois

**34 Years of Service to the
Heat Treating and Metal Finishing Industry**

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BUFFING COMPOUND

Here's why "LIQUISPRAY" saves you money over bar compounds

- No crumbling or nubbins — all the compound goes on the wheel
- Same regulated quantity applied
- No machine downtime to change bars

Here's what "LIQUISPRAY" can mean to you

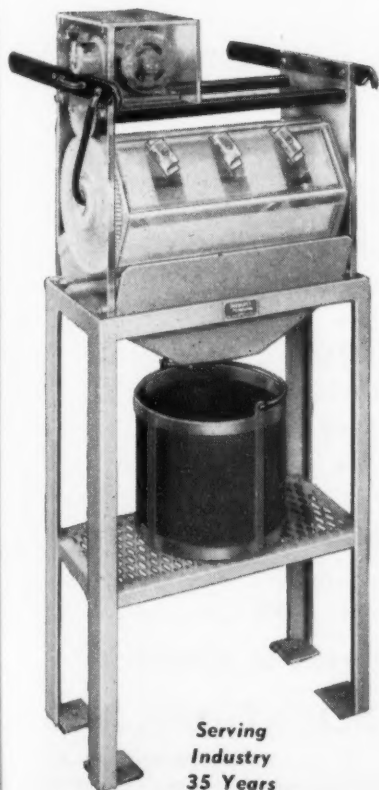
- Increase operator efficiency
- Compound costs cut up to 50%
- More uniform finish and fewer rejects
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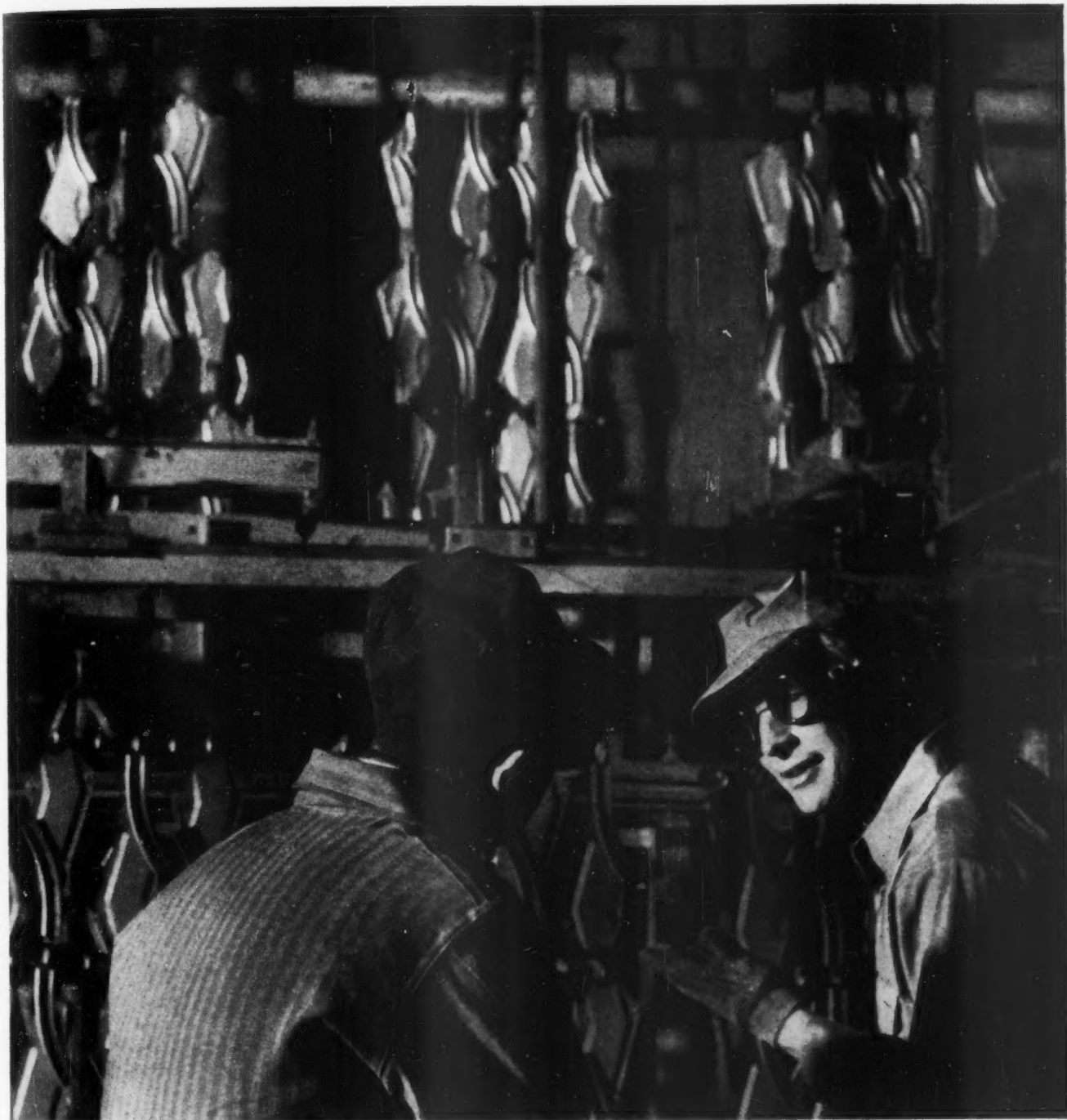
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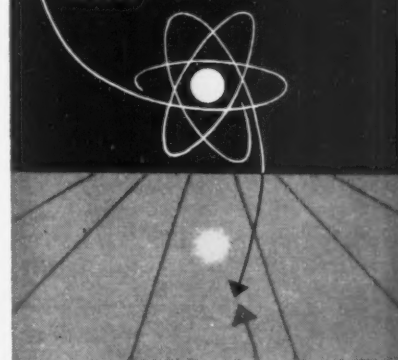
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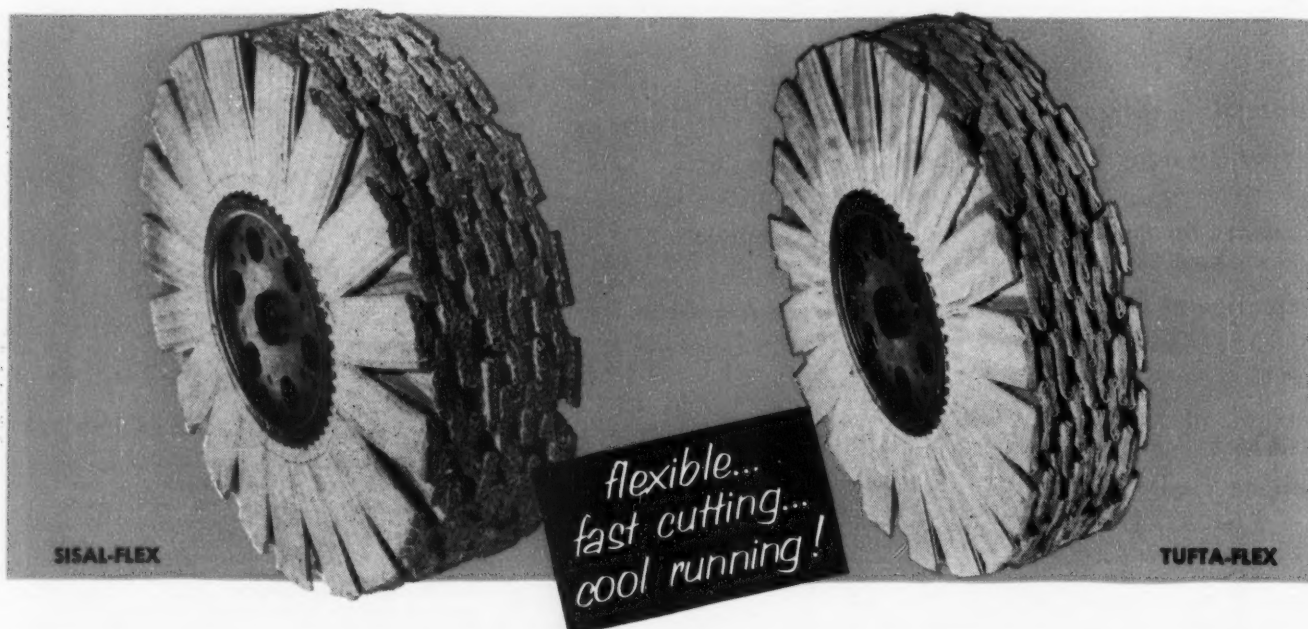


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ULTRASONICS

Only a year or two ago, agitation by means of high frequency vibrations was practically a laboratory curiosity in the metal finishing field, an unfamiliar term to most platers, and able to boast only a handful of commercial applications, mainly in cleaning and degreasing tiny precision parts which lent themselves to the small scale of the available equipment. Since these first applications were publicized, favorable reception and widespread interest have resulted in intensive efforts to develop equipment of greater capacity, and it is not unlikely that, in the near future, operation in fairly large tanks will be practicable with this technique.

The scope of this new metal finishing tool is enormous and the surface has barely been scratched, figuratively speaking. In alkaline cleaners and solvent degreasers, the removal of packed-in buffing compounds and soil is nothing short of amazing. Even complete assemblies and major subassemblies have been cleaned as a result of the ability of the sonic energy to penetrate into blind holes and all kinds of crevices and corners. As an aid to pickling and scale removal, acid action is greatly enhanced, flux, mill scale and corrosion being literally exploded from the surface with resultant saving of time and acid, reduction of attack on the basis metal, and possible minimizing of hydrogen embrittlement.

It is in electrodeposition processes, however, that virgin territory lies open for exploration. It has already been verified that, as would be expected from consideration of the fundamental principles involved, gas pitting can be completely eliminated and extremely high current densities employed without burning, thus obviating agitators and anti-pit chemicals. We once saw a demonstration in which an ordinary large steel washer, still coated with its film of oil and scale, was directly immersed in a standard cold nickel plating solution and plated at 300 amperes per square foot. This, of course, is not a point which would endear a salesman to a plater who has enough trouble already keeping his solution free from contamination, but it will serve as an indication of the possibilities of ultrasonics.

The scientists who have been engaged in this development, however, are not metal finishers. Their work has been along the lines of improving the ultrasonic power generators and the transducers which are capable of converting electrical to sound energy. Both titanate and nickel transducers are employed in commercial equipment and, although their relative merits are presently a subject of some controversy, this is a matter of no serious concern to the finisher. Of greater importance is the necessity for the inventive minds in our own industry to ferret out the possible applications in plating. We have been handed a very promising tool and it is now up to us to put it to use.

Nathaniel Hall

Proper Cleaning Methods Pay Dividends

By Lester F. Spencer, *Consultant, West Allis, Wis.*

Introduction

SINCE the advent of World War II, which emphasized the importance of proper cleaning procedures to meet a specification, industrial cleaning has developed into a science. In addition, increasingly severe specifications for quality manufactured articles, as exemplified in obtaining adequate bonding characteristics for those industrial finishes as galvanizing, tinning, painting, japanning, enameling and electroplating, necessitate a thoroughly planned and closely controlled cleaning schedule.

The three essential factors that should be considered in any cleaning operation would be the cleansing agent, the method of procedure, and the equipment. A fourth factor, which is an integral part of a cleaning operation, is that of labor. In recent years there has been considerable investigations of new cleaning procedures, which have resulted in the development of many new detergent materials derived from new synthetic techniques. Concurrently with the development of these new detergents, mechanical devices and cleaning systems have been developed for either batch or continuous processing in the removal of soil. At the present time, fully automatic equipment is available for almost any job on any production scale. It has been stated that 95 per cent of every cleaning dollar goes for both labor and overhead. Although this ratio may vary in individual cases, it can be stated that labor is the single largest item of expense in a cleaning cycle. Thus, the selection of both a method and equipment which will permit operating labor to a minimum is a necessity in keeping costs to a minimum.

Basic Concepts

The solution of any cleaning or related problem is governed by (a) those factors that affect the selection of the cleaning material; (b) by those factors that affect the selection of the cleaning method; and, (c) those factors that affect the selection of the cleaning equipment.

The selection of the cleaning material is primarily influenced by the nature of the "soil" or dirt that should be removed. As the term is commonly used, soil may mean a great number of things; it may mean oil or grease, metal chips, abrasive particles, smut,

rust, drawing compounds, carbon deposits, charred lubricant or quenching oil, shop dirt, flux deposits, or, salts that adhere to a part in the operations of hardening and tempering. It is futile to dream of any one "do all" chemical that would completely remove all types of soil, whether they are of animal, vegetable, or mineral origin.

Closely allied factors would be both the adhesion and the abundance of this soil. Thus, soil may exist as a thin film or as a thick layer; the thin film may require but a light duty cleaner, whereas a heavy layer of soil or a soil of complexity may require the installation of multi-stage cleaning operations. It is true that the part design will simplify cleaning operations; a smooth surfaced, simple design can be cleaned much more easily than one that may be hollow, drilled, seamed, engraved or embossed; the latter design will tend to pick up a larger dirt load and usually hold it more tenaciously. Soil adhesion will also govern the selection of a cleaning material in that a loose soil may only require a light duty cleaner, whereas a tight soil will require a heavy duty penetrating and suspending agent.

Another factor that would affect the selection of the cleaning material would be the comparative chemical activity of the parts to be cleaned. Thus, steel parts are not attacked by strong alkaline solutions, whereas items that are produced from aluminum, brass, tin, lead or zinc metals will require the use of buffered or inhibited chemicals which will remove the dirt without chemically attacking the basis metal. On composite assemblies, which may contain more than one material, the cleaning cycle will be governed by the chemical activity of the more susceptible metal.

The selection of the cleaning material will depend on the "quality" factor, i.e., whether a "chemically clean" or only a "physically clean" surface is required; whether the work should come from a cleaning operation wet or dry, or, coated for rust protection or with a phosphate or chromate conversion film for paint bonding. The term "physically clean" may have a variety of meanings. It may mean mere removal of metal chips and oil; it may mean that the parts must be sufficiently clean to pass inspection; or, it may mean that the parts are so clean that wiping with a clean cloth will show no smudge. Thus, in many instances, the degree of cleanliness will depend largely on both the material to be cleaned and the operations that follow the cleaning operation. However, the term

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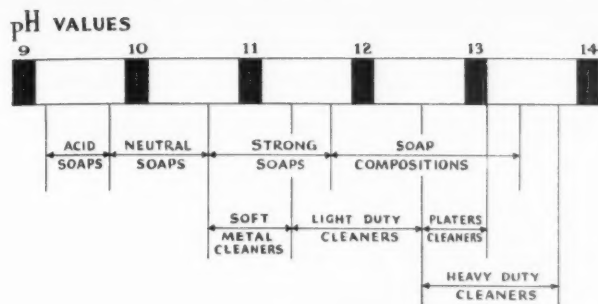


Fig. 1. pH range of industrial cleaners. Alkaline range is shown at usual working concentrations.

"chemically clean" has no variation in its meaning. As would be expected, each of the above will require a different cleaning method.

Those factors that influence the selection of the cleaning method will also be dependent upon the factors mentioned above: the nature, abundance and the adhesion of the soil. However, of greater importance would be the physical aspects of the work; its size and shape, and fragility. In addition, any preconceived ideas as to whether the work is to be cleaned on an individual basis, be racked on fixtures in fixed multiples, or handled in bulk quantities, will determine whether a spray or a dip operation will be the more effective. As to size, small parts can usually be handled quite economically in batches; the parts are placed in baskets and dipped into a cleaning solution. Large parts are usually handled more economically on an individual basis with either a dip or spray type cleaning cycle depending again on design of component parts. Work pieces that are fragile, or machine parts that are highly finished, would not be handled in bulk or tumbled.

The factors of production requirements, available floor space, and the "tie-in" of the cleaning cycle with other operations within a flow sheet, are major considerations in the selection of equipment. Production requirements will govern both the size of the equipment and the economics of conveyerizing the work. The available floor space will pre-determine equipment design; i.e., whether work flow will be either it will be a direct flow through the equipment, or, equipped with "U" turns. The possibility of conveyerizing several operations which either precede or follow the cleaning cycle should be investigated thoroughly to obtain the obvious advantages in the reduction of labor costs. Thus, an effective tie-in may be realized with such operations as pickling, conversion coating, painting, baking, or heat treatment operations. Other factors that may be mentioned, which will affect the choice of equipment to some extent, would include the availability vs. requirements of utilities, the versatility of equipment to permit the cleaning of different work materials at different times, and plant safety along with the degree of personnel hazards connected with the use of solvents.

Selection of a Cleaning Material

In general, detergent action is a result of a series of physical processes, although it is performed with materials classed as chemical. A cleaning operation

would consist of (a) a wetting of the surface and the penetration of the dirt by the cleaning solution; (b) an emulsification and dispersion of the soil by a combined action of the detergent, agitation, and heat; (c) the stabilization of the emulsion or dirt suspension by a soap film; and, (d) the dilution of the emulsion or suspension and its removal by rinsing.

Obviously, there can be no complete emulsification of the soil if the detergent does not have the penetrating power to wet the surface thoroughly — including the interior of the surface pits, microscopic fissures, etc., — and to both penetrate and soften the adhering foreign matter. The penetration is determined by the degree of alkalinity of the solution and by the presence of a suitable washing colloid as exemplified by a material such as a soap or a synthetic detergent. The alkaline range of industrial cleaners at the usual working concentrations is graphically illustrated in Fig. 1.

The second stage involves the dispersion of the oil or grease and the displacement of the solid particle soil from the surface of the part. The contributing factors in the disengagement of the soil from the surface of the part should include a low interfacial tension of the solution, the ability of the detergent or soap to contact and penetrate the soil, a sufficiently high temperature to melt fats and reduce the viscosity of the oils and, last but not least, agitation to overcome adhesive forces.

Stabilization of either the emulsion or suspension is predicated on an absorption or transfer of the cleaner from the solution onto the individual particles of soil, resulting in globules of emulsified oil. These globules are rendered non-coherent, finely subdivided as a suspension and, thus, they are in an easily rinsable form.

The fourth stage involves a resistance to re-solution of the adsorbed soil and re-deposition of this soil into the surface of the part. Dilution obtained in a rinsing operation should not cause the suspended emulsion particles to drop out and re-deposit on the surface being cleaned, i.e., the solution must be one that on dilution will not drop its "dirt load."

Cleaning operations are also realized through the action of solvents, as exemplified by either petroleum or chlorinated solvents, to dissolve oil and grease; or, water to dissolve soldering fluxes or tempering salts; or, alcohol to dissolve finger stains. In the event that oxides, rust, or tarnish are to be removed, chemical action is realized by the use of inorganic acids or cyanide solutions.

Selection of a Cleaning Method

Metal cleaning and related processing is usually realized by six general methods of handling the work in relation of the cleaning medium, thus: — (a) the use of still tanks where the work is given either a short dip or an extended soak; (b) the use of electro-cleaning tanks, either ordinary or supersonic, which is a variation of the first method with the addition of a current as the accelerator; (c) the use of washing machines in which the work is either sprayed or dipped; (d) by the use of a steam gun; (e) by solvent vapor condensing; and (e) by abrasion methods with grit, shot blasting, or tumbling. The prime methods

TABLE 1

*Compilation of the More Important Cleaning Materials, Their Application and Limitations.***SOAPS**—(soda, potash and amine)

For—soak tank removal of buffing, coloring and lapping compounds.

- washing off sulfurized and chlorinated oils.
- removal of rust preventive compounds.
- ball burnishing and tubbing.
- wire drawing lubricants (including calcium, magnesium, zinc and aluminum soaps).
- stamping and shape drawing lubricants.

SYNDETS

For—washing where high rinsibility and non-staining are essential.

- augmenting the action of alkaline cleaners.
- wetting and emulsifying.

ACID CLEANERS

For—descaling and derusting.

- simultaneously washing and phosphatizing steel.
- bright dipping brass, zinc and aluminum.

ALKALINE CLEANERS

For—soak tank cleaning of shop dirt, cutting or drawing lubricants, quenching oil, slushing oil, etc.

- electrocleaning of metal to be plated.
- spray washing machine cleaning.
- steam gun cleaning.

All of the above chemicals are made in three grades: Light Duty (no free caustic alkali) for use on corrodible or tarnishable metals.

Medium Duty.

Heavy duty (highly alkaline).

EMULSION AND SOLVENT CLEANERS (Neutral)

For—removal of soils not susceptible to alkaline cleaning; or on buffed metal tarnishable by alkaline cleaning.

- removal of carbonized oils.
- between operation washing to remove chips and

oil where a light film of anti-rusting oil should be left on work.

- use on electrical equipment or on highly finished steel as ball bearings and races, where water is not permissible.

OIL OR SOLVENT SOLUBLE DISPERSING AGENT

For—addition to processing oils or lubricants to make them self-emulsifying when brought into contact with water.

- use in petroleum solvents as "safety solvent" or kerosene, to improve their detergency, and to make them self-emulsifying when exposed to water rinse.

DIPHASE CLEANERS (forming unstable water emulsions)

For—removal of polishing, buffing and coloring compounds from metal surfaces.

STRIPPERS

For—alkaline stripping of finishes from steel.

- solvent stripping (in tank under a water seal) of finishes from any metal.
- stripping large equipment (machinery, etc.) with non-flammable viscous liquid which is subsequently rinsable by steam or water jet. May be used on any metal.

DEBURRING AND BURNISHING COMPOUNDS

For—cutting down and deburring metal parts.

- burnishing metal parts to high luster.

RUST PROTECTIVE COMPOUNDS

For—in process protection of steel parts by dip in dilute aqueous solution.

- displacing water film and forming protective imperceptible waxy film on cleaned metal.
- giving heavy film of permanently rust protective oil.

WATER WASH

For—water curtains in paint spray booth.

which are of immediate interest is the question as to: — Which method is better, *dip* or *spray*?

Fundamentally, any cleaning or related treatment using liquid solutions is concerned in placing the dirt in contact with the dirt remover for a predetermined length of time. On the surface, it appears that the method employed to obtain this contact is of little consequence; thus, either a dip or spray operation may be equally satisfactory in all cases, provided that the contact is *intimate* and *turbulent* in both instances. However, this is not a true statement since many jobs that can be done efficiently by a spray method cannot use a dip method to advantage, and, vice versa. Let us consider the spray method of cleaning.

Until recently, one of the primary reasons for favoring the spray method of cleaning over other types of cleaning equipment was due to the ability to con-

veyorize this type of equipment. Furthermore, spectacular pumps and powerful jets were quite impressive at a time when dipping in terms of buckets or tanks was a standard practice. However, due to the advent of conveyORIZED dip installations in which both intimate and turbulent contact is maintained, the question of dip versus spray equipment is considerably simplified with the sole consideration being the type of cleaning job to be accomplished. It must be remembered that the function of any washing machine is to ease and speed the action of the chemical addition and to eliminate hand labor.

The four job analyses, indicated in Fig. 2, will indicate the advisability of the spray method to perform a satisfactory job. In the event that small parts are loaded in a basket, as exemplified by Fig. 2a, even an excessive spray pressure will be nullified upon con-

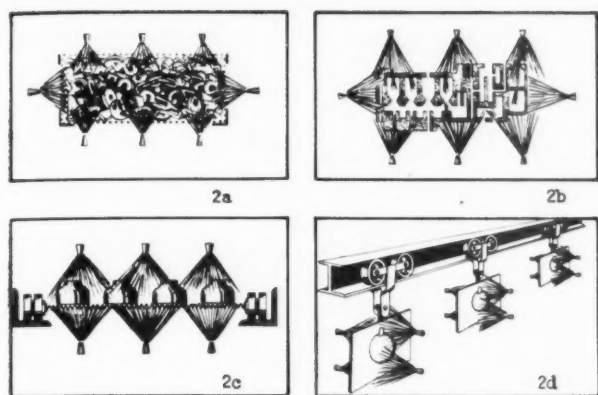


Fig. 2. Typical job analyses on the basis of spray method.

tact with the outside surface of the basket; this will prevent penetration to the center. This is definitely not a spray job since efficiency of operation will never be realized. Another example where a spray job is not advisable is that illustrated in Fig. 2b. No matter how many nozzles are used, how wisely they are located, or the amount of pressure used, the cleaning solution will not reach hidden areas and recesses of this intricate casting. However, typical jobs where spray technique can be used with high efficiency is illustrated in Figs. 2c and 2d. Thus, shallow draw pieces, flatware, and castings of simplified design properly positioned for correct drainage can be spray

cleaned. This is also true of sheet metal parts (Fig. 2d) that can be individually handled and sprayed from two sides simultaneously.

As has been mentioned previously, both intimate contact and turbulent contact between the cleaning material and the soil that covers the work are of prime importance for efficient cleaning. Intimate contact can be best established, in most instances, by using a dip method of cleaning; the solution surrounding every portion of the work. To realize turbulency, the spray method has the advantage over the dip method provided the latter method is in a static condition. However, this obvious disadvantage can be easily remedied by the use of some form of agitation and, thus, the two factors of intimate and turbulent contact can then be incorporated in a dip method. In addition, this method can also be conveyORIZED to use to advantage the lower labor costs which characterizes this method. With this in mind, the question will resolve into: — "To obtain turbulence, is it better to agitate the solution around the work, or, to agitate the work in the solution?" This question can be best answered by considering the examples given in Fig. 3.

Thus, Fig. 3a exemplifies the use of air to create a turbulent action in a cleaning solution. Air bubbles will cool the solution, provide little circulation within the recesses of the part and will actively combine with those ingredients within the cleaner which will promote a cleaning action. The combination of these fac-

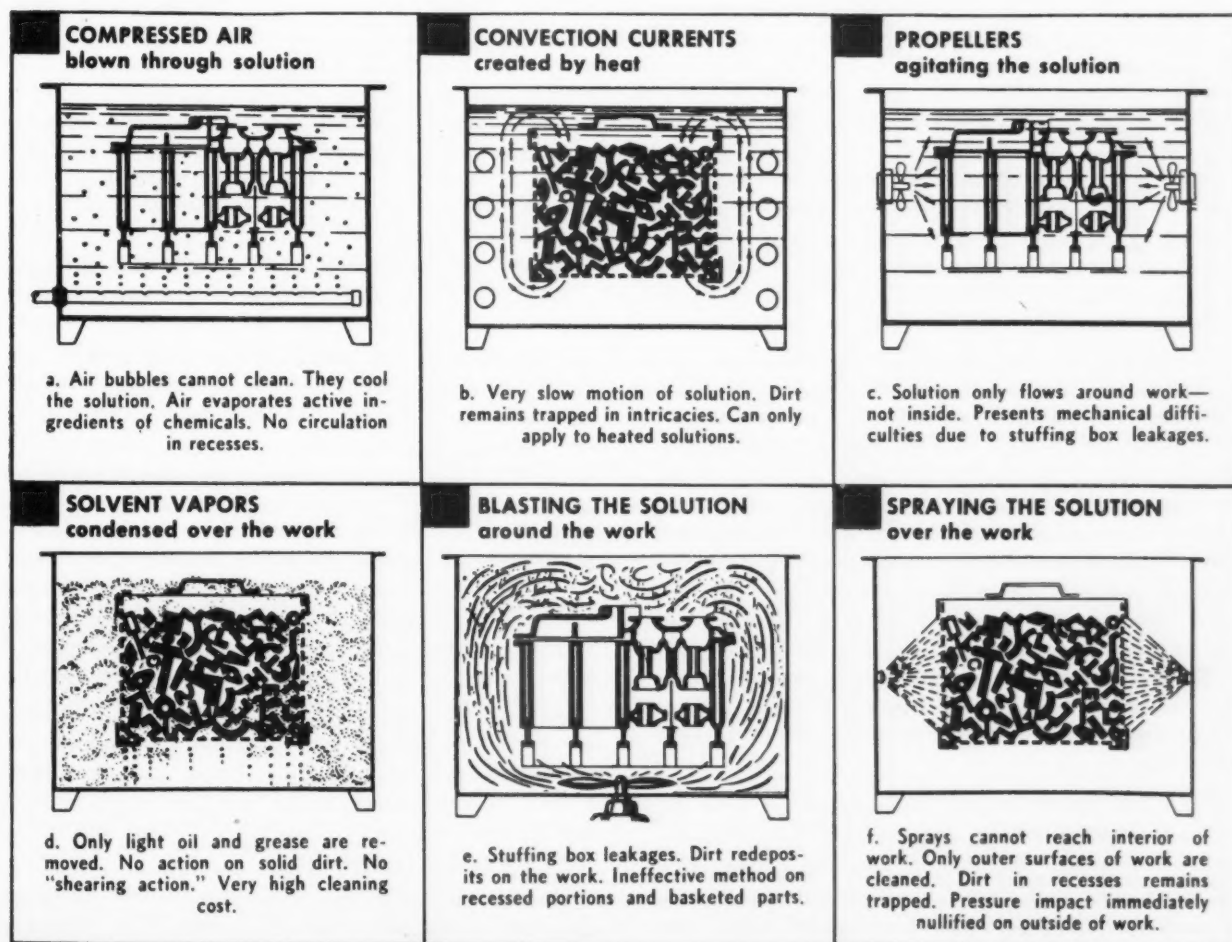


Fig. 3. Typical job analyses on the basis of method.

TABLE 2 — *Tentative Classification of Equipment for Metal Cleaning*

General Treatment	Cleaning Method		Servicing	Equipment Design	
	Dip or Spray	Agitation			
Dry Treatment	None	None	By Hand	Scraping - Filing - Brushing	
		Mechanical agitation of the cleaning medium		Grinding - Sand or Shot Blasting, Tumbling	
Wet Treatment With Solutions	Dip	None	By Hand	Scraping - Brushing - Wiping Hot Dip Tanks (a)	
		Mechanical agitation of the work	By Conveyor	Special Dipping Equipment	
			By Hand	Dip Machines Tumbling Machines (b)	
			Semi-automatic	Special Equipment	
			Fully-automatic	Conveyorized Equipment	
		Spray	Agitation of the solution	By Hand	High Pressure Liquid Cleaner (c) Hydro Air Washer Gun Spray Tanks Spray Cabinets
	Fully-automatic			Belt Conveyor Equipment Overhead Conveyor Equipment Turntable Machines	
	Spray & Dip Combined	Agitation of both the work and the solution	Automatic	Revolving Drum Washers Special Equipment	
	Wet Treatment With Vapors	Dip	None	By Hand	Vapor Degreasers
			Automatic	Vapor Degreasers	
Spray		Agitation of the solution	By Hand	Vapor and Spray Degreasers Vapor Steam Cleaners	
			Automatic	Vapor and Spray Degreasers	
Electro-Cleaning	Dip	None	By Hand	Electro-cleaning Supersonic Cleaning (d)	

- NOTES — (a) Hot Dip Tanks may be equipped with some means of agitation of the solution.
 (b) Tumbling barrels are generally used with a solution — some are used without.
 (c) High pressure liquid cleaning machines are sometimes used in combination with a compressed air system blasting solid shot over the parts.
 (d) Supersonic cleaning is new on the market and its applications seem to be limited to high precision light duty cleaning on very small parts.

tors will provide very low cleaning efficiency and, therefore it is not a recommended method. Fig. 2b illustrates the loading of small parts in a basket with the solution in constant motion. The difficulty of this cleaning method is that the soil will remain trapped and create an inefficient cleaning cycle. However, when it can be applied, heated solutions are recommended. The cleaning of a casting in which the solution is agitated by means of propellers, as exemplified in Fig. 3c, is also not recommended. Thus, the solution will flow around the work and, due to the barriers created by the work-piece, the solution in the interior of the part will remain quiescent. In addition, this design will present mechanical difficulties in that box leakage may occur.

The use of solvent vapors which condense over the work, as exemplified in Fig. 3d, will remove only light oils; grease will remain and the comparative action on solid soil particles will practically be nil. In addition, cleaning costs are usually high. The method of agitating the solution around a work-piece,

as illustrated in Fig. 3e, by means of a bottom propeller will also result in mechanical difficulties in that the tank may develop leaks. Due to the intricacy of the casting, dirt removal in recessed areas will be ineffective. Even in the event that basket parts are used, as indicated in Fig. 3d, the interior areas of the work load will not be reached. Spraying the solution, as in Fig. 3f, cannot reach the interior of basketed parts. The outer surfaces of the work will be cleaned efficiently; however, soil within the inner recesses will remain. Pressure impact of the spray will be nullified upon contact with the outside surfaces on the basket.

As indicated above, the six conventional methods in which the solution is moved around the work are not completely satisfactory. This leaves but one other avenue of approach in which the batch type method can be used effectively; that would consist of moving the work within the solution.

Due to the different types of cleaning machines that are available, it is quite difficult to establish an accurate and logical classification system. In ad-

dition, a classification system may be quite confusing because of the difficulty to clearly discriminate between neighboring types. However, with the limitations of any classification system as stated above, a tentative system is given in Table 2; this is based on the merits of a method and those optional features such as type of conveyor, method of heating, etc. have been neglected. A few words can be given on the most widely used equipment types.

Where speed is not essential, a standard hot dip tank is a satisfactory answer to batch cleaning. Immersion heaters provide convection currents which aid in the circulation of the liquid around the parts being cleaned. Mechanical agitation of the work within the solution permits both an intimate and turbulent contact so important to efficient cleaning.

Such equipment is individually operated and is serviced manually for loading and unloading the work to be processed. However, by far the most satisfactory installation whenever applicable, is the conveyorized multiple unit where operations can be grouped conveniently. Thus, in accordance to a flow sheet, such operations as pre-wash, wash, rinse, phosphatize, rinse, dry, etc., can be performed as a line function. In addition, these individual operations, each corresponding to one stage of a complete treatment, can be automatically serviced by means of a powered conveyor system with the result that dirty work is loaded on one end of the system and comes out entirely finished at the other end without any intermediate labor costs other than that used for loading and unloading.

Washing machines, that are fully conveyorized along with mechanical agitation of the solution, use spray nozzles and circulating pumps. A combined dip and spray washing machine, can serve exceptionally well for difficult cleaning jobs in that the advantages of both methods can be incorporated.

Conclusion

Knowing the composition of the soil that should be removed, a selection of the proper chemical can be made by referring to Table 1; this chemical should be chosen with a view of the properties of the metal to be cleaned, particularly the relative chemical activity, since corrosion of the base metal should be avoided.

The next step is to determine the effect of such factors as concentration of the chemical, temperature, and exposure time on the efficiency of cleaning. Exposure time is of extreme importance; a broad definition being the correct length of time during which the chemical must be in contact with the soil to effect complete removal. Light soil may be removed in a matter of seconds, whereas heavy soils, encrusted deposits, etc., may need minutes, or even hours of exposure.

The selection of an efficient method for cleaning is largely governed by the design of the parts, the manner in which these items will be handled and also by those considerations of fragility, existing surface finish, production required and cleaner chosen. The latter factor is of importance since quite a number of cleaner types cannot be adequately sprayed. On a practical basis, the choice of method would be limited between a dip and a spray method; the distinction between the two is mainly capital investment.

However, the pre-requisite of efficient cleaning, irrespective of method employed, is an *intimate* and *turbulent* contact between the soil and the cleaning solution. With the spray method, both of these pre-requisites exists at the point of impact of the spray but *not any further*. With the dip method the intimacy of the contact is insured and, in this respect, it is a much better method than the spray procedure. The more intimate the contact, the more thorough the cleaning; the more turbulent the contact, the faster the action.

The selection of the equipment is usually governed by the production requirements. If the production justifies the use of a conveyor system, the essential consider is the optimum conveyer speed necessary to deliver the output. If batch type equipment is advisable, the batch capacity should first be determined and then the number of batches to be handled per hour to satisfy the desired production.

There is no substitute for experience and, where cleaning problems are to be solved, it is recommended that a reputable supplier of either cleaners or equipment or both be consulted. Such a supplier will have a vast amount of experience obtained in previous installations which will be of benefit to any specific problem that may be confronted.

JUNE ISSUE TO FEATURE CANADIAN DIRECTORY

Our June issue, which will contain the program of the American Electroplaters' Society's Annual Convention in Montreal, June 17-20, will also have the first complete Directory of where to buy metal finishing equipment, processes and supplies in Canada. All Canadian firms for whom we have information—branch plants of American firms, distributors, jobbers, and individual representatives—will be listed with their address, telephone number, and a brief summary of their line of products or services. In the case of branch plants, distributors and jobbers, the names of the American or Canadian firms which they represent will also be given. In addition, there will be a Directory by products showing the sources of supply, and a cross reference Directory of American firms selling in Canada, listing their Canadian outlets. Information for this Direc-

tory is now being compiled. Firms or individuals interested in being listed should contact us, if they have not already done so.

A reprint of this information will be made up as a small booklet to be distributed at the Convention of the American Electroplaters' Society and will be available at the Sheraton-Mt. Royal Hotel. Additional copies will be available without charge from our office.

An announcement concerning a tentative program of the A.E.S. Convention will be published in our May issue. Present plans call for technical sessions, plant visitations, the M.F.S.A. Open House, an outing and luncheon in the Laurentian, annual meeting and banquet. G. R. Davidson of Canadian Hanson & Van Winkle Ltd., 260 Guizot West, Montreal, Quebec, is general chairman.

Coatings for Protection of Electroplating Equipment

By Michael Perez, Technical Sales Engineer, Metal & Thermit Corp., Rahway, N. J.

ECONOMICAL electroplating demands effective coating to protect equipment from the solutions used. Using the right coating not only cuts costs of replacing equipment, but provides other economies in operation. The right coating:

Saves metals and plating solutions by preventing plating of the racks.

Permits uniform quality, eliminating shading or burning of the work by confining current to the parts being plated.

Permits use of simple rack designs and plating fixtures.

Conserves power.

Reduces the cost of maintenance by simplifying repairs to coatings.

Tanks, racks, and other equipment used in electroplating require protective coatings that can stand up under the most severe conditions: immersion in dilute and concentrated acids; alkaline solutions at or near the boiling point; hot and cold water rinses; metal stripping solutions; anodizing solutions; powerful oxidizing solutions, such as chromium plating baths or bright dips for copper and brass; and hot concentrated plating solutions. Coatings are expected to resist attack by these solutions without any contamination of the plating bath.

The coatings must also maintain toughness and resili-

ency over the temperature range of the plating and cleaning baths. And they must stand up under normal abrasion while in use.

Finally, coatings should be easy to apply, using techniques and equipment readily available, and they should be easy to repair when damaged.

Coatings Available

Four types of coatings are currently used to protect electroplating equipment:

1. Tapes and rubber sheeting or strips.
2. Hot dip coatings such as waxes.
3. Solvent type coatings (dissolved synthetic resins).
4. Plastisols (paste dispersion resin coatings).

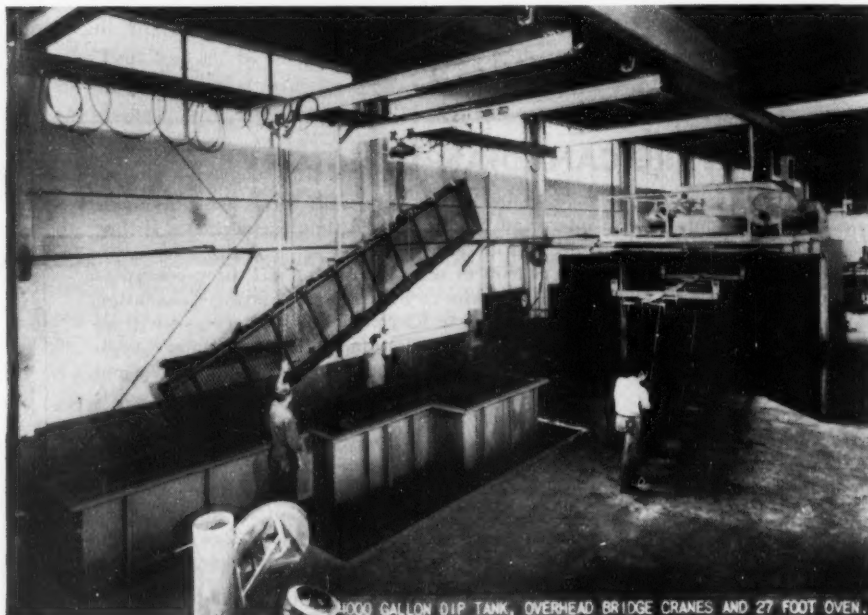
Tapes and rubber are not used for protection of frequently-used equipment or where conditions are very severe because they do not stand up and are costly to replace.

WAX COATINGS:

Hot-dip or hot-melt waxes are usually used as temporary coatings for protection from certain acids and plating solutions. They are particularly useful as stop-off coatings, limiting plating to specific areas of a part.

Waxes are economical; they must be reclaimed and used over again. Properly compounded waxes will deposit a heavy film in just a few coats and will insulate sharp edges very well.

Wax application is comparatively easy. The object to be coated is cleaned in a hot alkaline cleaner or an organic solvent, and thoroughly dried. The wax is usually kept in a steel vessel, electrically heated and thermostatically controlled. The temperature control should be accurate to within 25 or 30 de-



This large electroplating rack is dipped into plastisol tank at room temperature.

Development of spray techniques and compounds have made it possible to coat very large electroplating tanks with plastisols. Techniques employ standard spraying equipment.

grees F. The temperature of the wax depends on the particular compound employed — 220° to 250°F. and 360° to 390°F. are common. In general, the higher the temperature of application, the higher the temperature of decomposition of the resulting coating.

After the object has been cleaned, it is dipped in the hot wax and allowed to remain immersed long enough to reach the temperature of the wax. This immersion period may vary from one to five minutes. The work is then withdrawn from the wax and allowed to cool in air for a few minutes. A thin adherent film of wax should have deposited on the metal. Two or three additional dip coats are then applied. The same procedure is used, except that the object must be immersed and withdrawn quickly.

The wax coating may be easily removed either by scraping or by dipping the object in the hot melt. If removed by re-dipping, the coating must be dry and free from contamination. The thin film remaining after this re-immersion can be removed either by vapor degreasing or by the use of a solvent.

Wax compounds are stable and are not affected by repeated use. They can be contaminated, however, by certain acids, plating salts, or other impurities. These impurities result in the formation of lumps. If the lumps become objectionable, the contaminated wax must be discarded.

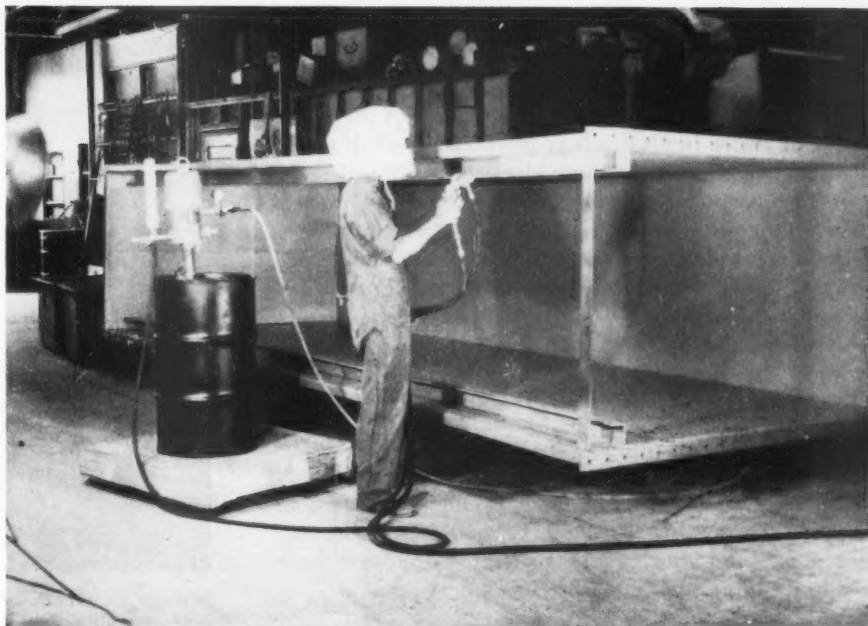
Adequate ventilation should be supplied when dipping in hot wax. Fumes from the hot melt are toxic if inhaled repeatedly. Condensation of fumes on the skin may cause inflammation. Workmen should wear gloves or use protective skin creams when involved in wax coating operations.

SOLVENT-TYPE COATINGS:

Solvent-type coatings (dissolved synthetic resins) were the first permanent rack coatings. Basically vinyls, these coatings are applied by dipping, brushing, or spraying. Dipping is the usual method used for racks, while brushing and spraying are used for tanks and objects too big to dip.

Solvents do not require baking at elevated temperatures, are easily repaired and can be removed simply when they have worn thin. However, they require multiple dip or spray applications. This is a limiting factor because the method is so time consuming.

Since these coatings are solutions, they deposit relatively thin films. Usually, eight to twelve dips are required before sufficient film thickness is obtained. Air-



drying or force-drying is required between coats. Force-drying is almost always used after the final coat. Then the object is cured at room temperature (usually overnight) before being placed in service.

LACQUERS — SPECIAL SOLVENT-TYPE COATINGS:

Lacquers, like waxes, are used as stop-off coatings. Lacquers consist of synthetic resins of the same family as the solvent-type rack coatings discussed above. Dipping, spraying, and brushing are all employed as application techniques.

Lacquers are fast-drying — only 10-15 minutes need be allowed for drying between coats and only 15-20 minutes after the final coat before immersing the rack in the plating solution.

Lacquers adhere very well to clean metal surfaces, yet they are easy to remove by soaking in an organic solvent or by peeling. They are tough, flexible, and chemically-resistant. They may be trimmed easily with a knife. Lacquers will not permit solutions to seep underneath and attack the metal from behind the coating.

Usually, three or four coats of lacquers are applied, except on sharp edges. Here, an additional two or three coats may be required.

Lacquers afford protection from all types of plating solutions. Some lacquers are especially compounded for use in copper cyanide solutions and in anodizing cycles. Others are resistant to vapor degreasing, for a limited time.

PLASTISOLS:

Paste dispersion resin materials have been used most extensively in recent years, replacing all other types of coatings in some shops. These dispersions are well known as "plastisols" or "plastic alloys."

A plastisol consists of solid particles of resin dispersed in a liquid medium. Plastisols provide seamless linings of any desired thickness. They are not restricted in application by complex shape of objects to be coated.

Plastisol properties comprise: toughness, electrical

resistance, elasticity, impact resistance, abrasion resistance, chemical resistance, fungus resistance, acoustical (sound-deadening) properties, and ease of application.

The chemical resistance characteristics of the vinyl chloride resins in plastisols produced by the half-dozen existing suppliers are almost identical. Chemical resistance properties of plastisols can be varied, however, by changing the ratio of resin to plasticizer, and by using different plasticizers or blends of plasticizers. Since several hundred different plasticizers can be used, it's possible to formulate a plastisol to meet almost any conditions.

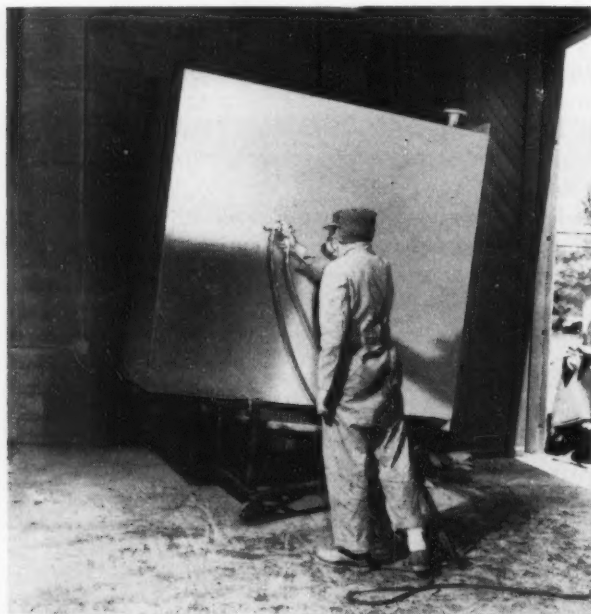
Application Methods

Plastisols can be applied in many different ways — molding, knife coating, roller coating, troweling, caulking, flow-on, dipping and spraying. Hot and cold dipping have been the most common methods, but compounds and techniques recently introduced have made spraying practical and economical.

HOT DIP COATING:

Thick coatings can be applied by cold dipping. By heating the metal first, coatings up to 1/4-inch can be applied in one dip. Several factors influence the thickness of hot-dipped coatings:

1. Temperature of the metal. The higher the temperature, the thicker the coating. Controlling the temperature of the metal is the easiest way to control coating thickness.
2. Immersion time. The longer the object is immersed in the plastisol, the thicker the coating.
3. Mass and shape of the object. If the mass of the object is great in comparison to surface area, more heat will be released, increasing the thickness of the coating.
4. Temperature of the plastisol. The higher the temperature, the thicker the coating. The temperature must



A new plastisol compound permits spraying plastisol coatings on cold vertical surfaces in thicknesses up to 60 mils in one application without sagging.



Plastisols are oven-baked at 350 degrees F. for about 20 minutes. Resins and plasticizers fuse to form solid, resilient coating that will resist harsh corrosive and abrasive conditions.

be held fairly constant as thickness of the coating may vary one mil per degree difference in temperature.

5. The specific heat of the particular metal to be coated. Thicker films are deposited on metals that absorb a great amount of heat.

SPRAY APPLICATION:

Plastisol applications are no longer limited by objects too big to dip. Sprayable plastisols that can deposit thick coatings in one application, without pre-heating or risk of sagging on vertical surfaces, have been developed recently. Spray coatings up to 60 mils can be deposited in one application.

Electrostatic spraying with plastisols is also a new development which will make application easier.

Curing Plastisol Coatings

However applied, plastisols are heated at 350 to 365 degrees F. for a short period after application. The resin dissolves in the plasticizer and the homogeneous compound solidifies into a tough, resilient plastic film. Radiant heat can fuse or cure thin coatings in a few seconds, but the usual practice is to oven-bake for 20 minutes after heat of the metal has reached 350 degrees F. This insures that fusing occurs throughout the plastisol — which is a good heat insulator — and that there is good adhesion between metal and plastisol.

Plastisols, which are used for both temporary and permanent coatings, require primers for permanent adhesion to metals. Primers usually consist of a blend of resins.

Potential uses of sprayable plastisols are virtually unlimited. Plastisols are now used in electroplating shops for coating conveyor hooks, baskets, tool handles, tanks and anode hooks, as well as plating racks. Plating room exhaust systems lined with this coating have already provided years of trouble-free service.

Although applying plastisol coating requires no unusual equipment or specialized knowledge, this work is being done most in the shops of applicators who specialize in tank fabrication and lining.

Detection of Chemical Protective Films on Aluminum and Aluminum Alloys

By A. J. Raffalovich and S. Firestone, Signal Corps Engineering Laboratories, Fort Monmouth, N. J.

A TEST method has been devised for detecting the presence or absence of chemical films on aluminum and aluminum alloys. It is required that aluminum parts and components used in military equipments be surface treated¹ but the determination of the presence or absence of these surface coatings is often difficult. Treatments specified for use on aluminum are either the anodic treatments or those that qualify under Specification MIL-C-5541, titled "Chemical Films for Aluminum and Aluminum Alloys." These films are utilized for their corrosion preventive properties and also because they form an excellent paint base. The test procedure specified in inspection manuals^{2,3} for chemical films on aluminum is mainly visual, with the exception of the test for anodically produced coatings. Since anodically produced coatings exhibit high electrical resistivity they can be readily detected by means of an ohmmeter.

Chemical surface treatments produce films varying in color from clear to dark brown. The films which are light in color make positive visual identification of their presence or absence almost impossible. If the chemical film is used as a paint base, its detection is even more difficult than when used as a final finish. To detect a chemical film beneath organic coatings, the coatings are removed by solvent application and mild abrasion with cheesecloth. This is continued until a spot or area is free of paint and primer. The light, or pale colors produced on aluminum by certain treatments are often masked by the reflected colors of the organic coatings during the inspection procedure. The visual test for detecting chemical films is, therefore, unsatisfactory.

TABLE I
Stannic Chloride Drop Test on
Untreated Aluminum

Alloy	Time (sec) for Initiation of Reaction	Time (sec) for appearance of black spot
3003(3S)	2	15
2024(24S)	1	10
Alclad 2024(24S) ..	7	20
5052(52S)	1	7

TABLE II
Stannic Chloride Drop Test on
Chemically Treated Aluminum

Chemical Films	Time (sec) for Initiation of Reaction			
	Alclad			
	3003(3S)	2024(24S)	2024(24S)	5052(52S)
Chromate A	50	30	30	60
Chromate B	25	70	45	20
Chromate C	45	25	60	25
Phosphate D	75	60	70	45
Phosphate E	45	75	45	35
Phosphate F	85	45	45	50
Oxide*	75	90	90	75

*NOTE: This chemical film is not to be confused with coatings produced electrochemically by anodizing. Anodized aluminum was found to be inert to the stannic chloride test solution.

Test Method

Seven surface treatments that have been approved under Specification MIL-C-5541 were used in this investigation. These included three chromate types, three phosphate types and one chemical oxide type. The oxide type is a film produced by a chemical dip and is not to be confused with coatings produced electrochemically, such as anodizing. A number of surface treatments that had failed to qualify under the specification were also used. Each of the above surface treatments was applied to four alloys which are considered to be representative samples of aluminum presently used. These alloys are 3003(3S), 2024(24S), Alclad 2024(24S) and 5052(52S).

A drop of 2 normal aqueous solutions of stannic chloride is placed on a solvent cleaned aluminum surface. If no chemical film is present, there is a violent reaction within 1-7 seconds. A black spot is formed on the metallic surface within 20 seconds. This is illustrated in Table I. If a drop of the reagent is placed on a MIL-C-5541 treated aluminum surface, there is no reaction for at least 20 seconds. This is illustrated in Table II. The time to form a black spot on the treated metallic surface is over 1 minute. The time for the initiation of a reaction on those films produced by treat-

(Continued on page 67)

ANALYSIS OF PHOSPHATING SOLUTIONS

Colorimetric Determination of Nitrate

By Lloyd O. Gilbert, Rock Island Arsenal, Rock Island, Ill.

Abstract

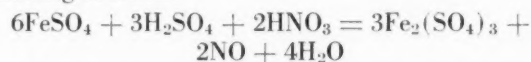
A METHOD for the determination of nitrate and nitrite in phosphating solutions was developed in order to provide a rapid, accurate method for control of nitrates in baths producing high quality phosphate coatings. Commonly used volumetric methods have proven to be too time consuming and inaccurate for use in routine testing and control work. Most of these procedures were indirect and required considerable manipulative ability on the part of the chemist or technician making the determination.

The widespread use of nitrates as accelerating agents in phosphating solutions has, for some time, presented a problem to both the phosphate coating research technician and to industrial metal phosphating process control chemists. A method for colorimetric determination of nitrates providing both speed and accuracy has been developed using a modified brown ring test procedure.

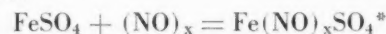
Introduction

1. The age-old qualitative test for nitrate, known as the "brown ring test," is familiar even to high school chemistry students. This qualitative test for nitrate is conducted by mixing the solution suspected of containing nitrate with a freshly prepared concentrated fer-

rous sulfate solution in a test tube. Concentrated sulfuric acid is then carefully poured into the test tube in such a way as to run down the inside of the tube and collect on the bottom without mixing with the solution. A brown ring forms between the heavy sulfuric acid and the lighter solution (containing the nitrate) floating on top. In the reaction the sulfuric acid presumably liberates nitric acid, this is reduced by a portion of the ferrous sulfate to nitric oxide in accordance with the following reaction:



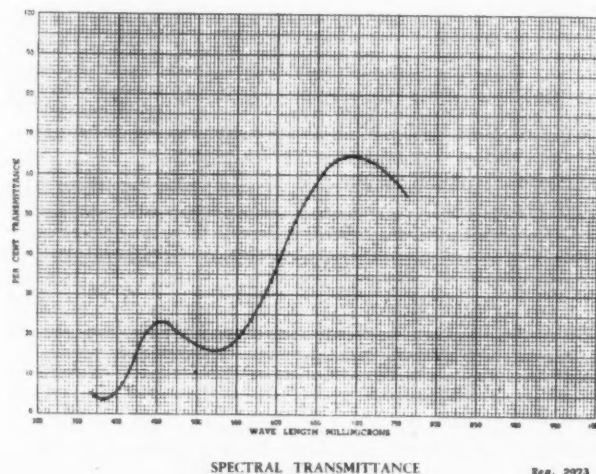
The nitric oxide combines with ferrous sulfate to form a complex compound sometimes assigned the formula $\text{FeSO}_4 \cdot x\text{NO}$.



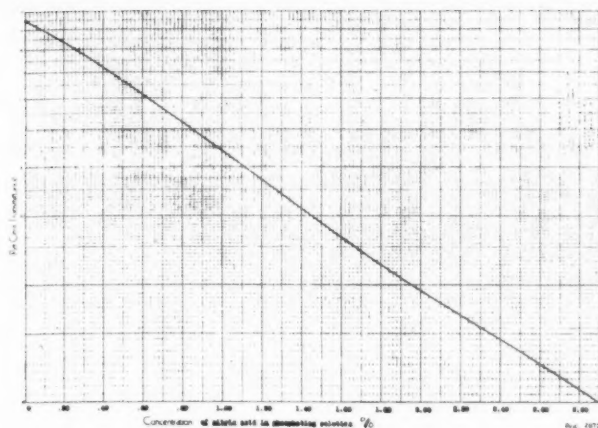
The complex is reasonably stable and the color spreads throughout the solution when the layers are allowed to mix. With slight modification the test has been adopted to accurate colorimetric estimation of nitrate and/or nitrite content of phosphating solutions.

Procedure

A 10 gram portion of C.P. sodium nitrate was dissolved in distilled water and diluted to approximately 1 liter. A 5 ml. portion was pipetted into a 50 ml. beaker and exactly 1 ml. of 10% solution of ferrous sulfate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) was added. Ten milliliters of concentrated sulfuric acid were then pipetted into the sample and ferrous sulfate solutions. After thorough mixing, the reddish-violet colored solution was allowed to cool and a spectral transmission curve was prepared for wavelengths from 350 to 775 millimicrons (see Fig. 1). A Model 11A Coleman Universal Spectrophotometer was used with a Coleman pc 4 cell filter. A wavelength of 520 millimicrons was selected for the transmittance-concentration measurements, Fig. 1. A series



*According to Treadwell & Hall (Analytical Chemistry: John Wiley & Sons, Inc., Vol. I, page 418) the nitric oxide combines with the ferric sulfate produced in the reaction and forms a complex compound having the formula $\text{Fe}_2(\text{SO}_4)_3 \cdot 4\text{NO}$.



of 13 standards was prepared by weighing out carefully dried C.P. potassium nitrate and preparing solutions containing the equivalent of from 0 to 5.8 g. of NO_3 per 200 ml. Dilutions were prepared representing from 0 to 2.9% NO_3 based upon an initial 2.9% solution concentration. A five milliliter aliquot of each of these solutions was pipetted into a 50 ml. beaker. One milliliter of a 10% solution of ferrous sulfate was then pipetted into the beaker. Ten milliliters of concentrated sulfuric acid were then allowed to run into the beaker from a pipette. Upon mixing, a reddish-brown to violet color developed. The heat generated by the addition of the sulfuric acid does not adversely affect the development or stability of the color. The colored solution was then transferred to a 19 mm. cylindrical cuvette and, using distilled water in the comparison cell, the transmittance was determined at a wavelength of 520 millimicrons. When the percent transmittance was plotted as the ordinate and the concentration in percent as the abscissa, a straight line was obtained, thus indicating conformance with Beer's law in the concentration range investigated (see Fig. 2). A direct adaptation of the technique to phosphating solution analysis was then investigated. The procedure was found to be completely satisfactory without alteration and is carried out as follows.

Nitrate in Phosphating Solution

Pipette 5 ml. of phosphating solution into a 200 ml. volumetric flask. Dilute to the mark and mix thoroughly. Carefully pipette a 5 ml. aliquot of the diluted solution into a 50 ml. beaker. Add exactly one ml. of 10% ferrous sulfate solution using a pipette. Then allow exactly 5 ml. of concentrated sulfuric acid to run slowly into the beaker from a pipette. Mix well and obtain transmittance at 520 millimicron wavelength, using distilled water in the comparison cell. Determine percent nitrate (as NO_3) from the standard transmittance-concentration curve.

Notes on Procedure

(1) If desired, the 10% ferrous sulfate solution and the sulfuric acid may be combined. Only 10 ml. of the resulting mixture need then be used, but a new standard transmittance-concentration curve should be prepared.

(2) If, on mixing the reagents with the phosphating solution, the color forms and then disappears, the concentration of nitrate in the original sample is too high. A greater dilution of the original sample may be made.

(3) Concentrated sulfuric acid must be used in the determination. The color will not develop if dilute acid is used.

(4) Volumes of the sample, ferrous sulfate and sulfuric acid are critical and all measurements must be of pipette accuracy. For example, if a 10 ml. portion of diluted solution sample is used instead of 5 ml. the color will develop momentarily and then disappear. Addition of water to the solution after the color has been developed will cause the color to disappear. Care must be used to avoid use of wet beakers or cuvettes.

(5) The stability of the developed color was determined by making transmittance readings on a group of solutions of varying nitrate concentration daily for ten days. No perceptible fading was observed providing that the solutions were protected from absorption of atmospheric moisture.

(6) The order of addition of the ferrous sulfate, sulfuric acid and sample produced no observed effect on reproducibility of results. However, where *nitrite* accelerated solutions are to be tested, the order of addition should be: (1) ferrous sulfate, (2) sulfuric acid, (3) sample solution. The sample solution should be added with a fine tip pipette held under the surface of the sulfuric acid to prevent loss of sample due to spattering.

DETECTION OF CHEMICAL FILMS

(Continued from page 65)

ments that failed to quality under Specification MIL-C-5541 is very close to that of untreated aluminum. This may be fortuitous. The time to form a black spot on the surface is approximately 20 seconds.

The same spot test is used to detect a treatment when used as a paint base. The paint is removed as described above. The abrasive action of the cheesecloth should be as gentle as possible. Any harsh abrasive action may remove the chemical film from the aluminum surface. If there is any doubt, due to abrasion, as to the presence of a chemical film beneath a paint coating, it is recommended that a drop of the test solution be placed over a line scratched on the aluminum. If the scratch and surrounding area react after approximately the same length of time or within a few seconds lag, the chemical film is absent.

This test procedure is not recommended to differentiate between a specification approved finish and one that is not.

This test procedure is not recommended to differentiate between a specification approved finish and one that is not.

References

1. Specification MIL-F-14072 (SigC), "Finishes for Ground Signal Equipment."
2. Raffalovich, Aubrey J. "Inspection Kit for Finishes," Technical Memorandum M-1379, Signal Corps Engineering Laboratories, Fort Monmouth, N. J. (June 22, 1951).
3. TB SIG 234, "Inspection Kit MK-97/U (Metals and Finishes)" "Department of the Army and Air Force (July 21, 1952).

Surface Treatment and Finishing of Light Metals

Part XII-D. Plating on Aluminum — The Vogt Process

By S. Wernick, Ph.D., M.Sc., F.R.I.C. and R. Pinner, B.Sc.

IN Great Britain a somewhat different process has been used for the successful plating of aluminum articles on a commercial basis for more than 20 years. The process has been particularly applied in the finishing of hollowware, and the immense amount of chromium plated ware of this kind on sale is direct evidence of the successful nature of the process. Yet, until very recently, little or nothing appeared in the technical literature relating to this well-tried and, indeed in many quarters, well-known technique. One of the first accounts of the process was given in 1950 by R. Fyfe.¹ A very useful statement on the process together with a full description was given by A. Wallbank in 1952,² and an interesting publication on the practical aspects of plating aluminum hollowware was presented by R. Ore later in the same year.³

This process has come to be known as the Vogt process, after B. Vogt, who developed the technique originally at Newcastle-on-Tyne round about the year 1929. Vogt, however, was not the originator of the process, the early work on which was carried out, according to Ore, in Ludenschied, Westphalia, Germany, by two German technicians, Loebe and Worster. It would appear that some of the pioneer work was also carried out by a Dr. Nast, also in Germany. It is not known how successful the German workers were in carrying out the process, or, indeed, whether it was used on a commercial scale before it was brought to England. There is no doubt, however, that to Vogt belongs the credit of having developed the original ideas to the point where plating could be carried out confidently and successfully on a commercial scale. At the present time it is very widely employed and, for this reason, it is proposed to devote the present chapter to an examination of the technique in some detail.

Wallbank, in his paper, underlined the difference between the type of zinc deposit obtainable by immersion as against that produced by electrodeposition, to the advantage of the latter method. He pointed out that deposition of a film by immersion relies essentially upon the single electrode potential of the basis metal. Hence, if the latter were uniform it would be possible to obtain an even immersion film, but, where there are any local variations in the basis metal as a result of which two adjacent areas have different electrode potentials, this must inevitably affect the character and thickness of the immersion film. The production of an even film is then no longer a certainty and, since in commerce few aluminum articles are entirely homogen-

eous, the production of a satisfactory immersion film cannot be produced with any degree of certainty. Since very many articles are constructed from different aluminum alloys which in turn may have been subjected to different degrees of cold working and heat treatment, this becomes a matter of considerable practical import.

Again, aluminum articles are frequently associated with other metals in their construction, such as steel, brass, copper or solder, which would have a deleterious effect in the production of a uniform zinc coating. From the practical viewpoint, when the article is plated it is normally wired or racked and this again produces a difference of potential between the wire or rack material and the article if, as normally happens, there is a difference in composition between the plated metal and the wire.

The Vogt process is characterized by the factor which cuts across the difficulties described above, namely, the application of an electrodeposited zinc film which can be produced with certainty irrespective of the composition or construction of the aluminum components, be these cast or wrought, pure or alloyed, soldered or riveted. The zinc deposit is uniform but too thin to resist chemical attack when it is subjected to the normal nickel plating solution, hence the next stage in the process is to superimpose a thin deposit of brass.

Another characteristic of the Vogt process is that after final plating, say, with nickel, and before chromium plating, the components are subjected to heat treatment. Details of the sequence of operations are given below.

Preparatory Treatment

The articles are prepared by subjection to the following sequence of five operations, namely:

- (1) Electrolytic clean;
- (2) Rinse;
- (3) Acid etch;
- (4) Rinse;
- (5) Second electrolytic clean

The first electrolytic cleaning process is carried out in a solution having the following composition:

Caustic soda	4.5 oz./gal.
Sodium cyanide	4.5 "
Sodium carbonate	2.25 "

The conditions of operation are: a line voltage of

about 7, the work being cathodic; temperature 70°F.; period of cleaning 3 to 5 minutes.

The tank containing the solution is of unlined steel and the anodes are of sheet steel.

Acid etch: The acid etch consists of sulphuric acid and concentrated nitric acid in equal volumes, used at room temperature, the time of immersion being of the order of 2 to 5 seconds.

The second electrolytic cleaner is made up as follows:

Caustic soda	2.25 oz./gal.
Sodium cyanide	2.25 "

This solution is also used at room temperature and the work is made cathode at around 7 volts. The time of cleaning ranges between 10 and 30 seconds.

Initial Plating Sequence

The next operations consist of:

- (1) Zinc plating;
- (2) Brass plating;
- (3) Thorough rinse.

DEPOSITION OF ZINC:

Zinc is deposited from a bath of the following composition:

Zinc chloride	0.08 oz./gal.
Sodium cyanide	0.08 "
Caustic soda	1.7 "

This bath is operated at room temperature and at a low current density of the order of 5 amp./sq. ft. The time of plating is normally 20 seconds. The tank set-up is normal for zinc plating, i.e., constructed of steel and using zinc anodes, which are only kept in the bath when plating is carried out.

When the work is removed from this bath, it should normally present a uniform bronze color. If the work appears to be darker, e.g., a blue-black appearance, it indicates that the plating is in excess of the thickness desired.

DEPOSITION OF BRASS:

The work is then taken directly to a brass plating solution of the following composition:

Copper acetate	2.0 oz./gal.
Zinc chloride	2.0 "
Sodium cyanide	5.0 "
Sodium carbonate	1.5 "
Sodium bisulphite	2.0 "

The electrolyte is operated at a temperature of between 80° and 90° F. at a current density of 7 to 10 amp./sq. ft. Time of plating is not more than 8 seconds usually. The anodes used in the solution are of 70/30 brass sheet. The brass deposit, when the articles are taken from the bath, should have a pale yellow appearance.

Nickel Plating

The components are now ready to receive the nickel deposit. When they have been brought out of the brass plating solution, they must be very thoroughly rinsed and the time between brass and nickel plating needs to be reduced to a minimum. According to Wallbank, the customary acid dips which are interposed between cy-

anide and nickel solutions may not be employed since the initial deposits are excessively thin.

The nickel plating bath is of the following composition:

Nickel sulphate	40 oz./gal.
Magnesium sulphate	16 "
Sodium chloride	0.75 "
Boric acid	4 "

Plating is carried out 10 to 15 amp./sq. ft. at a pH of 5.6 and a temperature of 115°F. The solution is air agitated and continuously filtered. The anode area should be approximately three times that of the cathode.

Heat Treatment

When the articles have been adequately nickel plated they are baked for half an hour at a temperature of 450°F. This heat treatment procedure is in itself an excellent quality test of the quality of the deposit. Good quality plating will be found to be entirely blister-free after baking and may be nickel finished and chromium plated without difficulty or the production of a non-adherent finish. On the other hand, if the deposit has not been correctly applied it will blister during the baking operation.

It is claimed for the process that practically all types of aluminum alloy may be nickel-chromium plated, employing the sequence as described with little or no modification. The only exceptions are alloys which contain magnesium in excess of 3 per cent; such material may need special care and attention to produce plating of adequate quality.

Ore's Variation on the Vogt Process

Considerable experience in the application of the Vogt process has been gained during the last two decades and a very interesting commentary on the process, as described above, has been published recently by B. Ore.³ Ore's experience is based on the production of aluminum teapots at the rate of 200 per hour. Articles of this type are either pressed or spun and are first polished or buffed without difficulty, although heavier gauges and castings, etc., require to be felt and emery bobbied and buffed; after the latter treatment they are usually degreased in trichlorethylene and then "colored," using dry lime. It is considered highly advisable to prepare only that amount of work which can be dealt with in the plating shop during the same day. Work which is left overnight is likely to produce a greater percentage of rejects due to adhesion troubles.

Ore's sequence of operations is similar to those described by Wallbank but there are certain significant differences. The preparatory sequence prior to zinc plating is as follows:

- (1) Electrolytic clean; (2) Rinse; (3) Acid etch; (4) Rinse; (5) Acid etch; (6) Rinse.

The first electrolytic cleaner is similar to that described above, i.e., composed of a caustic soda, sodium cyanide and sodium carbonate. Ore prefers a rather higher temperature, i.e., about 150°F., the work being cathodic for a much shorter time—only 30 seconds instead of 3 to 5 minutes.

The first acid etch, instead of being sulphuric acid-nitric acid mixture consists of 5 per cent by volume hydrofluoric acid. This is used at room temperature and the articles are immersed for 5 seconds.

The second etch consists of a 50 per cent by volume nitric acid solution. This is also employed at room temperature and the time of immersion is about the same, i.e., 5 seconds.

Plating Sequence in Ore's Variation

The sequence of operations thereafter is as follows:

- (1) Zinc plate;
- (2) Rinse;
- (3) Brass plate;
- (4) Rinse;
- (5) Neutralize;
- (6) Nickel plate, etc.

The zinc plating solution again differs from that noted above, the metal content being higher while, in addition to zinc chloride, sodium cyanide and caustic soda, a small amount of ammonia is added. The composition is as follows:

Zinc chloride	0.4 oz./gal.
Potassium cyanide	0.2 "
Caustic soda	4.0 "
Ammonia (0.880)	0.055 pint/gal.

The conditions of operation are room temperature; about 3 volts; plating period of only 3 to 4 seconds.

Ore does not employ zinc anodes — he uses the tank, which is of welded iron, as the anode side of the circuit.

Entry of the components into the zinc plating bath should close the plating circuit and thus eliminate any possibility of producing an immersion film of zinc.

The brass plating solution also differs somewhat from that given earlier and is made up as follows:

Copper acetate	1.6 oz./gal.
Zinc chloride	2.24 "
Sodium carbonate	1.6 "
Sodium bisulphite	2.54 "
Potassium cyanide	6.8 "
Magnesium chloride	0.32 "

Conditions of operation are room temperature; a current density of about 10 amp./sq. ft. and a plating time as little as 2 seconds. Anodes are of 70/30 brass sheet, or may consist of separate copper and zinc anodes, the copper area being approximately about twice that of the zinc. The deposit obtained in this manner is a dirty yellowish brown and, in fact, looks quite unattractive.

It will be seen that the main difference in the use of this solution is that the zinc/copper ratio is higher, whereas the time of plating is considerably less.

The process then makes a very marked departure from that described earlier in that an acid neutralizer is employed as an intermediate step before nickel plating. This consists of a 10 per cent tartaric acid solution operated at room temperature and requiring an immersion time of about 5 seconds.

The nickel plating solution favored by Ore thereafter is as follows:

Nickel sulphate	16.0 oz./gal.
Sodium sulphate	2.4 "
Boric acid	1.6 "
Citric acid	0.4 "
Sodium citrate	2.4 "

Conditions of operation are as follows: Temperature 100°F.; current density 10 to 20 amp./sq. ft.; time 20 minutes; pH 5.6; air agitated; continuous filtration.

However, despite these differences, it would appear that a nickel electrolyte of special formulation is really not essential to successful operation of the process. Probably any good Watts-type nickel solution would be adequate for the purpose.

With regard to the brass plating solution, most of the proprietary brands on the market also appear to be used with equal success.

Heat Treatment

Considerable emphasis is laid by Ore on the heat-treatment processes which need to be applied to the components not only after the nickel plating stage but also after chromium plating.

HEAT TREATMENT AFTER CHROMIUM PLATING

The deposit is considered to be not fully adherent immediately after it has been nickel plated and, to produce the desired degree of adhesion, the components are now removed from the racks and placed on iron trays. In so doing, hollowware should be so arranged that any vapor which rises from the work during heat treatment may escape, since otherwise local breakdown of the deposit is likely to result.

Apparently iron is favored as the only suitable metal for trays, since, for example, when trays were made of aluminum, blistering tended to occur wherever the nickel plating touched the aluminum.

Heat treatment is applied within a temperature range of 400° to 500°F. The precise temperature and also the time are said to be dependent not only on the thickness of the aluminum sheet or casting but even on the shape of the article. A very practical method of determining when the articles have been adequately heated consists in sprinkling some fine sawdust, preferably boxwood, both on the trays and between the articles. Heat treatment may be taken as complete as soon as the sawdust turns to a coffee-brown color. This may appear to be a rudimentary method but, since it has been used for very many years with consistently good results, it obviously has considerable merit.

The articles appear to be quite dull when they have been heat treated and this somewhat drastic process undoubtedly shows up the good quality plating from the bad. If the nickel plating has not been properly applied, the work will usually show blistering.

No doubt the heat treatment results in a degree of diffusion of the various deposits, zinc and brass, into the aluminum and a corresponding bonding of the nickel deposit to the diffused layer.

HEAT TREATMENT AFTER CHROMIUM PLATING:

After the articles have been suitable colored they are chromium plated in the normal manner and then again heat treated in a slow oven maintained at between 350°

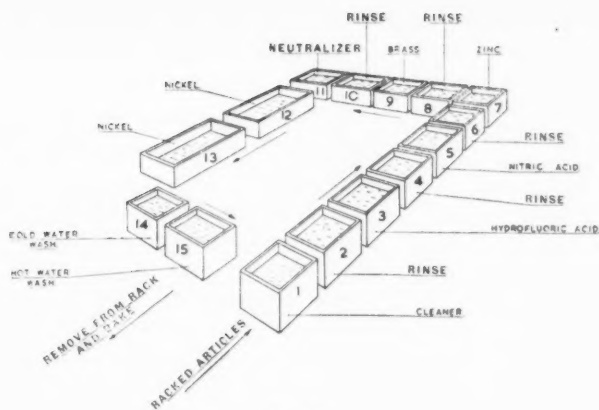


Fig. 1

and 400°F. for some five minutes. Thereafter they are chrome "finished" and the latter operation is considered to be essential even though the deposit may not appear to require a finishing operation. If this is not done, experience has shown that the chromium plating will not be adequately protected.

A picture of a plant layout advocated by Ore is shown in Fig. 1, and the sequence of operations in this plant, which will produce some 200 chromium plated aluminum teapots per hour, is as follows:

- | | |
|----------------------------|---------------------------------|
| (1) Clean; | (9) Brass plate; |
| (2) Rinse; | (10) Double rinse; |
| (3) Hydrofluoric acid dip; | (11) Tartaric acid dip; |
| (4) Rinse; | (12) Nickel plate; |
| (5) Nitric acid dip; | (13) Cold rinse; |
| (6) Double rinse; | (14) Hot-water dry-off; |
| (7) Zinc plate; | (15) Remove from rack and bake. |
| (8) Rinse; | |

The work circulates as indicated by the arrows and the plant shown is actually operated by three workpeople. The first worker looks after the first six operations, operator No. 2 proceeds to zinc and brass plate, while operator No. 3 is engaged in the nickel plating process.

It is believed that the process described above is very largely one which has been used in a selected number of British plants devoted to the plating of aluminum. The process is undoubtedly a tried one and has been found to be entirely reliable if carried out strictly in accordance with the procedure which has been indicated. It may accordingly be confidently recommended for the particular purposes mentioned. It appears to be a very suitable process for operation particularly on a small to moderate scale.

The B.N.F. Modification

Although the Vogt process has the practical advantages listed it has also one or two obvious disadvantages. The first is the baking treatment which is expensive in that it requires individual handling and the additional labor of unracking and re-racking for chromium plating, as it is not possible to use a bright nickel deposit on which chromium plating can be carried out directly. The baking treatment means also that it is not possible to mechanize the sequence by the use of automatic equipment. The second disadvantage is the fact that it is not possible to obtain good adhesion on aluminum alloys containing 3 per cent or more magnesium.

Recent work by Edwards and Swanson at the British Non-Ferrous Metals Research Association⁴ has been

directed to overcoming these disadvantages. These authors set out to combine several of the features of the zincate process with the Vogt process. In particular, it was found that, if the chemical aluminum surface was treated by the normal zincate process and the zinc deposit subsequently stripped, the adhesion was so far improved that baking could be dispensed with. A tentative explanation of this is the greater uniformity of the oxide film found on the aluminum after stripping the first zinc coating, resulting in faster deposition and a greater number of zinc crystals in contact with the aluminum.

The full sequence in this case was:

1. Trichlorethylene degrease.
2. Cathodic clean at 7 volts for 5 minutes at room temperature in a solution containing sodium hydroxide 28, sodium cyanide 28, and sodium carbonate 14 g./l.
3. Rinse for 5 to 10 seconds.
4. Immerse for 5 second in a solution of equal volumes of sulphuric acid and nitric acid at room temperature.
5. Rinse 5 to 10 seconds.
6. Cathodic clean at 7 volts for 30 seconds at room temperature in sodium hydroxide 14, sodium cyanide 14 g./l. solution.
7. Immerse for 3 minutes in a sodium zincate solution containing sodium hydroxide 525, zinc oxide 100 g./l. at room temperature with gentle movement of the work.
8. Rinse.
9. Strip zinc deposit in 50 per cent nitric acid vol.).
10. Rinse.
11. Zinc plate for 20 seconds from zinc chloride 0.5, sodium cyanide 0.5, sodium hydroxide 10.5 g./l. at 4.5 amp./sq. ft. at room temperature.
12. Brass plate for 10 seconds from copper acetate monohydrate 13, zinc chloride 13, sodium cyanide 31, sodium carbonate 7, sodium thiosulphate 13 g./l. at 9 amp./sq. ft. and 28° to 30°C., using 70/30 brass sheet anodes.
13. Double rinse for 5 to 10 seconds each rinse.
14. Nickel plate from nickel sulphate 250, magnesium sulphate 10, sodium chloride 47, boric acid 25 g./l. at 40° to 42°C., pH 5.5 to 5.7, 12 amp./sq. ft. for one hour with continuous filtration and agitation to give 0.0006" nickel; or bright nickel plate.
15. Rinse.
16. Dry-off from hot water and polish, or direct chromium.

It was possible by this process to obtain good adhesion on alloys containing 3.5 per cent magnesium, while a 7 per cent magnesium alloy could be plated provided the baking treatment was resorted to after nickel plating.

Since its development, this modified process has been used for commercial plating of aluminum hollowware and has proved very successful.

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Science for Electroplaters

23. Chemical Surface Preparation

By L. Serota

Alkaline Cleaning

REMOVAL of soil from a metal surface by alkaline cleaners is attained by surface displacement, a physical method or, in the case of fats and some oils, by the formation of a water soluble soap resulting from a chemical reaction. This chemical process of soap formation is called *saponification*. Since soap is a good detergent, it will reduce the surface tension or interfacial tension of a liquid to which it is added, thereby aiding in the displacement of soil from the metal surface. Greases and oils present will thus be emulsified (oil in water emulsion).

The soap solution will also have a suspending action (deflocculation) on the solid particles, dispersing them through the solution by colloidal action. This process makes it possible to remove such soil from the surface by mechanical means and prevents re-deposition of the soil on the metal surface.

Surface-Active Agents

Soap is the most common member of a class of compounds known as surface-active agents or *surfactants*. An increasing number of synthetic surface agents is available for use in metal finishing. The most common of these synthetic products may be grouped in three major categories: (1) sulfated fatty acids (2) fatty acid amides (3)

alkyl aryl sulfonates. Although the molecular structure of these compounds is complex, the essential parts may be described as consisting of a portion which possesses water soluble or polar properties (i.e., strongly attracted to water or *hydrophilic*) and another portion possessing oil soluble (*hydrophobic*) properties. This latter portion of the molecule will attach itself to or dissolve in oils, fats, waxes, and non-polar materials. If the hydrophilic (water-soluble) portion of the structure is greater, a wetting agent is obtained; if the two groups are in balance it is then classified as a detergent; if the hydrophobic (oil soluble) portion is greater than the hydrophilic portion, emulsifying agents, softeners, and dispersing agents result.

These synthetic surface-active agents may be classified as anionic, cationic and non-ionic. A product is anionic or anion active when the main or active part of the molecule is contained in the anion or negative portion. This group has powerful wetting properties, is resistant to hard water, and exhibits good detergency. It is the type most frequently used in cleaning compositions. Fatty alcohol sulfates and sulfonated fatty acid esters are included in this group. The anion group consists of a long hydrocarbon chain possessing oil-soluble (*hydrophobic*) characteristics, plus a water-soluble (*hydrophilic*) cationic group. Soap is called an anionic surface-active agent because its surface-active ability is attributed to the anionic group of its molecule.

With cationic detergents the surface activity is attributed to the cationic group of the molecule. The anionic portion consists of chloride, bromide or iodide ions. They are poor detergents and are not suitable for use in alkaline metal cleaners, since such compounds are decomposed by alkalis.

Non-ionic synthetic detergents do not, of course, ionize. Both hydrophobic and hydrophilic groups are present in such molecules and surface activity is the resultant of the properties of these groups. This type of synthetic detergent is compatible and can be used with either anionic or cationic materials. They are excellent emulsifiers and rapidly remove oils, waxes, etc.

Type of Cleaners

Alkaline cleaners should meet the following requirements:

1. The ingredients should be soluble, stable, and possess good rinsing properties.

2. The alkalinity should be suitable for the metal to be cleaned. For steel, the pH may be above 12; in anodic cleaning (in caustic) the iron will be attacked at high current densities; for copper, brass and related alloys a pH of 10 to 11 is recommended to avoid tarnishing; for aluminum, tin, zinc, and lead, because these metals react with alkalis, a pH range of 9 to 11 is preferable. The cleaner should be buffered to help maintain constant activity.

3. The cleaner should possess good wetting power.

4. It should have a high emulsifying power to break up and disperse saponifiable oils and greases.

5. Dirt particles should be deflocculated and dispersed throughout the solution by colloidal action.

6. An inhibitor should be included for such metals as aluminum, to reduce attack on the metal.

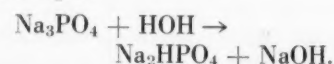
7. The cleaner should possess water softening properties to prevent precipitation of hard water salts on the metal surface.

8. Cleaners must, of course, have a non-irritating effect on the skin and should be preferably non-toxic.

9. They must be economical.

The materials commonly used in alkaline cleaners include sodium hydroxide (caustic soda); such alkaline salts as sodium orthosilicate, Na_4SiO_4 ; sodium metasilicate, Na_2SiO_3 ; sodium carbonate (soda ash), Na_2CO_3 ; trisodium phosphate, Na_3PO_4 ; tetrasodium pyrophosphate $\text{Na}_4\text{P}_2\text{O}_7$; sodium hexametaphosphate (NaPO_3)₆; and synthetic organic surface-active agents or soaps. Organic chelates are also used as complexing agents for metal ions.

The effectiveness of the alkaline salts in cleaning is related to the hydrolytic action in aqueous solution. This results in a high hydroxyl ion concentration (alkaline solution) which brings the pH of the solution above 7. The following equation may be used as an example:



Addition of free alkali will reverse

ALKALINITY OF SALTS USED IN ALKALINE CLEANERS FOR METALS

Anhydrous Alkaline Salt	(Equivalent total Na ₂ O Content)		ml. of 0.1 N H ₂ SO ₄ tolerated before reduction of pH below 10
	Weight of anhydrous salt in 40.0 ml.	Original pH	
Sodium hydroxide	1.60 grams	13.6	40
Sodium orthosilicate	2.07 grams	13.3	37
Sodium metasilicate	2.83 grams	13.0	36
Trisodium phosphate	2.19 grams	12.1	13
Sodium carbonate	2.12 grams	11.4	5
Tetrasodium pyrophosphate	4.46 grams	10.1	0.5
Sodium tetraborate	3.62 grams	9.3	0

the reaction, so that the pH of the solution containing a salt will remain fairly constant (buffered). The concentration of the specific salt and the temperature of the solution will determine the pH. Such pH values may vary from 8 to 11. To obtain a higher pH (above 12) the addition of free alkali is required. Alkalinity is usually expressed in terms of the oxide (Na₂O) content. J. W. Hensley reported in METAL FINISHING that variations with four of the common alkaline salts over the range of 0.1 to 1.0 per cent Na₂O had no appreciable effect on cleaning results (with stearic acid), but concentrations above 1 per cent Na₂O caused a rapid loss of cleaning efficiency. The results indicate that available Na₂O rather than molar concentration is the controlling factor. This may also be shown by a study of the ability of alkaline salts to maintain an alkalinity range upon the addition of acidic soil. The table shown above indicates the relative quantities of 0.1 N H₂SO₄ required to reduce the pH of the solution for some alkaline salts to a value of 10, based on equivalent total Na₂O content.

It is evident from the data that the silicates, which show such pronounced resistance to pH changes in addition to their ability to stabilize emulsions, enhance deflocculation, lower surface tension or interfacial tension, and act as inhibitors with such metals as aluminum. These properties account for the effectiveness and extensive use of these salts in alkaline cleaners. Caustic soda, however, though maintaining a high alkalinity, is not effective because its detergent potential is low. The data also indicate that sodium hydroxide should be included in cleaners containing phosphates or carbonates so that such salts can show a greater tolerance toward acidic soils. Where

silicates are used, the concentration of carbonates must be kept low, since the silicates are decomposed, producing a heavy floc which redeposits on the metal surface.

Alkalies are poor wetting agents. For example, water with a surface tension of 73 dynes per centimeter will not readily wet oils, which have relatively low surface tensions. The addition of wetting agents, however, to alkaline cleaners, lowers the surface tension of the solution to that of the oil (contaminant) thereby removing the soil rapidly.

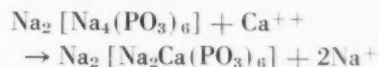


Figure 122. Initial breakup of oil film to form drops which float to the surface.

Fig. 122 indicates the initial breaking up of an oil film to form drops (globules) which float to the surface. This effect results when the oil film becomes quite thick. The difference in specific gravity between the oil and the cleaning solution provides a buoyant action with the oil breaking away in the form of drops. Fig. 123 represents the final stage in the removal by shrinkage of the oil film. The flattened globules of oil are readily observed.

Hard water, which contains calcium

and magnesium ions (also iron), will form insoluble soaps which may deposit on the metal surface. Sodium carbonate and phosphates are added as water softening agents. Phosphates form flocculent calcium or magnesium phosphates which are free-rinsing. Polyphosphates and chelates act as sequestering agents. The concentration of the polyvalent metal ions is reduced by these polyphosphates and chelates with the formation of complex compounds, thus preventing precipitation by soap. The polyphosphate, sodium hexametaphosphate, reacts as follows:



The sequestering materials also hold back floc formation and have a peptizing (disintegration process) effect on dirt. The polyphosphates will change to the orthophosphate form (Na₃PO₄) if heated above 160°F. for a prolonged period. This change will result in a loss of the sequestering property of the polyphosphates, so that soap precipitations or scums may result in the presence of calcium or magnesium ions.

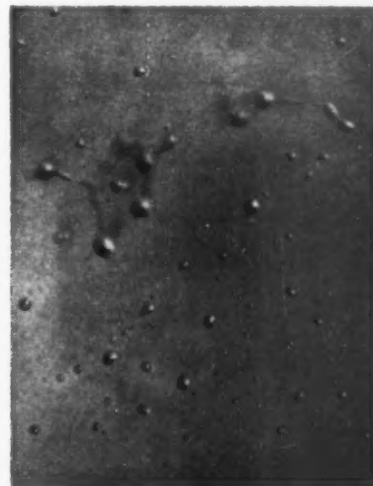


Figure 123. Shrinkage of oil film has resulted in formation of adhering globules.

Inhibitors in alkali cleaning provide a protective film formed by the reaction of the inhibitor with the metal (aluminum) or with the oxide surface. With silicates, a molecular layer of hydrated silica may form. Compounds used as inhibitors may include silicates, chromates, phosphates, fluorides, fluosilicates, or organic materials.

The use of soap as a wetting agent should be avoided in cleaners intended for aluminum, zinc, etc., since these metals form insoluble soaps. In pressure-spraying with alkaline solu-



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tions, soaps or other surface active agents are objectionable because of the tendency to excess foaming. Foaming may be controlled to some extent by introducing anti-foaming agents such as silicones or kerosene. The alkaline salt concentration in the pressure-spraying method is lower. Only 1/4-2 oz./gal. is used, and the cleaner is changed oftener than in soak cleaning to avoid clogging.

Soak-Tank Cleaning

Soak tank cleaning is the most readily set up and the most feasible procedure for small scale operations. Large scale operation can be adapted to pressure-spray cleaning, which includes mechanical action. Soak tank cleaning depends, to a great extent, upon the surface activity of the cleaner and the agitation caused by mechanical action, owing to the motion of the work in the bath, circulating the cleaner, or repeated re-immersion in the cleaning solution. Another method for applying agitation is to maintain the alkaline cleaner at a rolling boil. Soak cleaning is more effective than spray cleaning for irregularly shaped objects, since not all of the surface of such pieces is exposed to direct impingement of the spray. The concentration of the cleaner ranges from 4 to 10 oz./gal. and is used at temperatures ranging from 180°F. to a rolling boil. Overflow pipes in such tanks enable oil floating in the top of the bath to be removed conveniently.

Electrolytic Cleaning

An important consideration in the cleaning cycle is the time factor. This is reduced appreciably by the electrolytic cleaning process since, in addition to immersion cleaning, the gases liberated at the electrodes provide a very effective method of mechanical agitation, a process which is frequently described as a scrubbing action. The same type of compounds used in immersion cleaning generally provide good conducting solutions for the electrolytic bath. When the object to be cleaned is made the cathode, the steel tank or steel plates serve as the anode. Cathodic cleaning up to recently was the most common method used, because the large volume of hydrogen evolved (2 volumes of hydrogen compared to 1 volume of oxygen liberated at the anode) provided a more vigorous stirring at the electrode; and the

free alkali generated by the electrochemical action could speed up the cleaning process. Mechanical properties of the metal, however, could be impaired by hydrogen embrittlement. In addition to this problem, the deposition, as a film or smut, of metallic impurities dissolved in the cleaner solution may cause poor adhesion.

The trend, therefore, in recent years, has been to combine cathodic and anodic cycles, a reverse current effect, so that traces of precipitated metals are dissolved (depleted) anodically. Straight anodic cleaning has also been widely used and found to be very effective. In anodic cleaning of non-ferrous metals, a slight film of oxide or tarnish may form on the object; hence a shorter period of time than that required for steel (1 to 2 minutes) is used. Steel also may form a passive film due to oxidation. Thorough rinsing after the cleaning cycle is essential, preferably in two separate rinse tanks.

Electrolytic cleaning baths should not contain chlorides or other reagents which would react (through electrolysis) with the electrode or cause it to be etched. Soap and wetting agents which would cause excessive foaming action should be avoided. A thick foam blanket presents a hazard because of the accumulation of hydrogen and oxygen, an explosive mixture in the presence of sparks. This condition (sparking) may result from racking operations on the bus bars. A foam blanket of fine bubbles, which break soon after forming, is desirable as a means of holding down the spray which entrains strong alkali. Surface active agents, such as fatty acids and rosin soaps that may be plated out, or organic matter that may be decomposed, should also be avoided. Small parts are conveniently handled in tumbling barrels where combined electrocleaning and mechanical action can be obtained. Immersion cleaning is also employed for bulk articles.

Because high conductivity is important, electrolytic cleaners will usually contain excess caustic soda. Such baths operate at high concentrations (6-14 oz./gal.) and high temperatures (180°-200°F.). The current density range extends from 25 to 100 asf at 4 to 6 volts, with 50 asf recommended. Anodic cleaning generally operates at a lower current density to avoid smut on steel and brass.

SHOP PROBLEMS

ABRASIVE METHODS SURFACE TREATMENTS CONTROL
ELECTROPLATING CLEANING PICKLING TESTING



METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Coloring Copper

Question: Can you supply a book, "Metal Coloring and Bronzing" by Hiorns? We are interested in all the information we can get about coloring plated copper.

W. G. J.

Answer: "Metal Coloring" by Hiorns has been out of print for about 15 years and is unavailable except in some of the large public libraries.

We are forwarding tear sheets of the formulas for oxidizing copper and brass from the 1954 edition of the METAL FINISHING GUIDEBOOK. These are the commonly used processes.

Immersion Copper Plating

Question: We are interested in using a copper plating process in which a copper sulfate solution is atomized and mixed with an aqueous solution containing finely divided iron or zinc. There are patents connected with these processes and I wonder if you have any information concerning the prior use of similar chemical reactions which might show that the above processes have been used before and are therefore not novel.

Any information regarding a method of depositing a copper film over a silvered surface will be greatly appreciated.

J. A. D.

Answer: The reply to this question will involve a patent search, which can be performed by any qualified patent attorney. The patent referred to appears to be based on the use of a spray gun to project the copper sulfate solution and reducing metal powder. Production of copper films from copper sulfate solutions was used for a great many years by electrotypers on

their graphited wax cases. This process, termed "oxidizing," involved sprinkling iron filings over the surface wetted with the solution. Electrotypers do not generally use this method any more because silvering methods and substitution of plastic for the wax have obviated it.

Gold-Germanium Alloy

Question: In a previous issue of your METAL FINISHING magazine you had an article on a low melting point high karat gold solder containing an alloy germanium and additional alloys. We would like to know if it would be possible for you to give us the composition on the above.

E. A. H.

Answer: The gold solder containing germanium is the eutectic mixture of 88% gold and 12% germanium. This has a melting point of 673°F.

Chromic Acid in Nickel Solution

Question: Is there any way to kill chromic acid in a nickel solution (Watts type)? If so, would you please advise.

E. F. H.

Answer: Chromic acid can be destroyed by many reducing agents. If the amount of contamination is not large, it is suggested that small amounts of sodium sulfite be added, since this chemical is readily available. The minor amount of sodium ions introduced will not affect a Watts nickel solution.

However, if the amount of chromic acid present is large, sulfur dioxide gas can be bubbled into the solution. This gas can be obtained in small amounts from any large laboratory supply firm. These firms can also supply sulfurous acid solution containing about 6%

SO₂, which may be more convenient to add.

Swirl Finish

Question: We would like to have information available as to the proper procedure to obtain the swirl like effect that is used on flat disc pieces of brass and other metals. We have tried using a flat felt disc loaded with fine abrasive, such as Butler finish, but this does not get the swirl effect. Is this done with a fine flat scratch brush, and if so where can these brushes be obtained? These metal discs vary from 3" to 10" in diameter.

G. P. M.

Answer: The swirl effect is produced by contact with a rotating pad of steel wool chucked in a lathe. The pad may be wrapped with cord to form a cylinder which will not disintegrate readily.

Copper Backing Mirrors

Question: I am very much interested in getting information on electrocopper backing of mirrors, by the galvanic process. It is a rather new process and I would appreciate your cooperation in finding anything in same.

H. L. M.

Answer: A patent was recently issued to M. Meth (U.S. Pat. 2,720,437) on a process in which a solution of copper sulfate is applied to the glass mirror simultaneously with a suspension of metal dust in water. Copies of the patent are obtainable at 25c from the Commissioner of Patents, Washington 25, D. C.

Copper can also be applied to the silver film by wetting with acid copper sulfate solution and then sprinkling on iron filings.

"Browning" Gun Barrels

Question: Do you know the method of producing a brown finish on gun barrels. I have a gun that dates back to about 1906, and it had a sort of walnut colored finish. I know of no method of "browning" steel and if you

know of a method, I would appreciate receiving information on it.

W. M.

Answer: The procedure is as follows:

1. Dip, brush or sponge on:

Copper sulfate	20 g./L.
Mercuric chloride	5 "
Ferric chloride	30 "
Nitric acid	150 ml./L.
Denatured alcohol	700 "

After applying the above, place in a warm, damp place until a good layer of red rust forms.

2. Boil in water until the rust is converted to black oxide
3. Dry and scratch brush with a steel wire brush
4. Repeat all the above steps 3 times
5. Oil with an oxidizing oil such as linseed.

Smut Removal from Steel

Question: We have been investigating the removal of heat scale from steel pieces prior to plating them. The sequence of operations was as follows:

1. Soaking in an alkaline solution
2. Rinsing
3. Pickling in 15% sulfuric acid to which an inhibiting agent has been added
4. Rinsing
5. Electrocleaning in an alkaline solution
6. Rinsing
7. Immersing in a 50% hydrochloric acid solution
8. Rinsing.

The heat scale was loose when the parts reached step 8, but since it was not removed, it had to be removed by hand brushing. This entailed a considerable loss of time and money.

We would like to install equipment in the sulfuric acid tank to make it possible to have an anode cleaning operation and we are writing you for advice on the operating temperature, the amount of current to use and the type of inhibiting agent to add.

R. J.

Answer: Smut removal electrolytically in sulfuric acid is obtained by the use of a 25% by weight solution or higher, at room temperature and 100-400 amp./sq./ft. This, however, will produce an etched finish.

Good results can also be obtained with reverse current at 20 amp./sq. ft. in a solution of 3 oz./gal. sodium cyanide.

Plating Nitralloy

Question: We have a problem of copper plating Nitralloy 135 modified steel; Spec. MIL-3-6709. We use the copper as mask-off on areas which do not get a nitride hardening.

We have not been getting good adhesion to the base metal. We have tried everything which we know about plating steel. We have treated it as stainless steel by giving it an electric etch in a 30% muriatic acid and also in a similar solution of sulfuric. Neither solution has given us a satisfactory result. Our test for adhesion on these parts is with a pocket knife.

Our plating process consists of a Rochelle copper bath as a striking solution and the pyrophosphate copper

bath. All parts are thoroughly clean before plating.

P. M. A.

Answer: Nitralloy 135 contains a small amount of chromium and molybdenum and should be prepared for plating in the same manner as stainless steel.

One of the procedures described on pages 228-231 of the 1956 edition of the METAL FINISHING GUIDEBOOK should be employed for the purpose. A recommended method is to strike in a solution of 0.05 oz. copper sulfate in 1 gal. hydrochloric acid unless a trace of nickel is permissible, in which case the strike consisting of 2 lbs./gal. nickel chloride and 1 pint/gal. muriatic acid is suggested.

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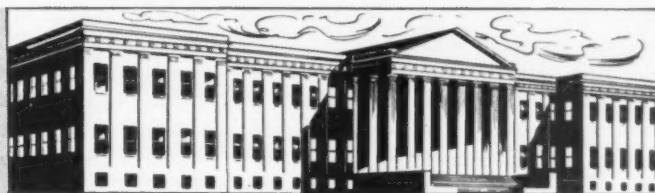
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Patents

RECENTLY GRANTED PATENTS IN THE METAL FINISHING FIELD



Conversion Coating

*U. S. Patent 2,760,890. Aug. 28, 1956.
J. C. Kosmos, assignor to The Chemical Corp.*

A bath for imparting a corrosion resistant film to copper and magnesium surfaces and consisting of an aqueous solution consisting essentially per liter of solution of substantially 300 grams sodium bichromate, 132 grams nitric acid, 180 grams glacial acetic acid, and 52.4 grams sodium chloride, and water added to said solution in an amount of from 1 to 100 times the volume of said solution.

Detinning Apparatus

*U. S. Patent 2,762,620. Sept. 11, 1956.
W. H. F. Miehe, assignor to Metal & Thermit Corp.*

Apparatus for the solution detinning of tin scrap comprising a rotatable perforate outer drum, a central cylinder inside said drum, helical means interposed between said drum and said cylinder, said means dividing the annular zone between said drum and said cylinder into a plurality of flights, each accommodating a quantity of scrap, said helical means being arranged to advance said scrap from the intake end of said drum to the discharge end thereof.

Etching Aluminum

*U. S. Patent 2,762,694. Sept. 11, 1956.
K. W. Newman, assignor to Turco Products, Inc.*

A method of etching an aluminum object which comprises: treating the aluminum with an aluminum non-corrosive acidic solution, the temperature and acid concentration of said treating solution being related to render the solution an active reagent for the removal of aluminum oxide from said object and substantially non-corrosive to aluminum, the duration of said treating being only substantially for the time required to remove an oxide coating from said object; coating a portion only of the treated surface of the

object with an alkali resistant resin based coating composition for aluminum; and treating the aluminum object with an alkaline etching solution; thereby etching said surface treated with said etching solution.

Electroless Nickel

*U. S. Patent 2,762,723. Sept. 11, 1956.
P. Talmey and G. Gutzeit, assignors to General American Transportation Corp.*

The process of chemically plating with nickel a body essentially comprising an element selected from the group consisting of iron, cobalt, nickel, aluminum, copper, silver, gold, palladium and platinum, which comprises contacting said body with an aqueous bath consisting essentially of nickel ions and hypophosphite ions and also containing sulfide ions and a sulfide ion controller, both said sulfide ions and said sulfide ion controller being present in solution in said bath only in controlled trace amounts that together are not greater than about 200 parts per 1,000,000 parts of said bath by weight so as not substantially to reduce the plating rate of said bath, said sulfide ion controller forming with said sulfide ions a thio-compound that is both stable and substantially insoluble in said bath so as to maintain the dissociated sulfide ion concentration in said bath of the order of magnitude of 1 part per 100,000,000 parts of said bath by weight in order to inhibit random decomposition of said bath.

Conversion Coating

*U. S. Patent 2,762,731. Sept. 11, 1956.
F. P. Heller and F. P. Spruance, Jr., assignors to American Chemical Paint Co.*

The method of producing a paint-bonding surface on ferrous metal surfaces which comprises treating the clean surface with a solution containing as its essential coating producing ingredients chloride, complex fluoride and chromate radicals, the complex fluoride being from the class consisting of fluosilicate, fluozirconate, fluoborate,

fluotitanate and fluostannate (calculated as ammonium fluosilicate on a fluorine basis), the pH of the solution lying between 0.8 and 5.5 and the said ingredients being present in approximately the following amounts:

Chloride (calculated as ammonium chloride): 0.05% to 17% of the solution.

Complex fluoride (calculated as ammonium fluosilicate): 0.5 part to 2.0 parts for each part of chloride but not less than 0.025% of the total solution.

Chromate (as CrO_3): 0.03 to 5.0 times the amount of total chloride plus fluoride present, calculated as ammonium salts.

Pickling Stainless Steel

*U. S. Patent 2,762,728. Sept. 11, 1956.
E. A. Hahn, assignor to Lyon, Inc.*

A method of pickling wrought stainless steel, that comprises the step of immersing the steel in a bath consisting of an aqueous pickling solution of 5-20 weight per cent sulfuric acid and 5-20 weight per cent nitric acid at a temperature of 120-180°F.

Metalizing Non-Conductors

*U. S. Patent 2,762,725. Sept. 11, 1956.
A. E. Saunders, assignor to Pittsburgh Plate Glass Co.*

A method of producing a metal film on a refractory base having a metal oxide film thereon from the class consisting of tin, cadmium, indium and zinc oxides, combinations thereof and films containing at least 70 to 80% by weight of tin oxide with minor proportions of at least one oxide from the class consisting of oxides of antimony, copper, thallium, vanadium, chromium, manganese, cobalt and titanium, which method comprises subjecting the metal oxide film to a metal, an acid and an aqueous solution of a metallic salt, said metal taken from the class of metals more electropositive than the metal of the metal oxide film consisting of zinc, cadmium, iron and aluminum, said acid taken from the class consisting of hydrochloric, hydrobromic, sulfuric, phosphoric, phosphorus and sulfurous

acids, and said salt taken from the class consisting of ferrous chloride, ferric chloride, ferric ammonium oxalate, ferric citrate, cobalt chloride, cobalt sulfate, cobalt phosphate, cobalt acetate, cobalt ammonium sulfate, nickel chloride, nickel silicofluoride, nickel cyanide, nickel tartrate, nickel acetate, nickel formate and nickel sulfate, the proportions of said acid and metal salt being from about 9 to 100 mol equivalents of acid per mol of metal salt.

Metalizing Non-Conductors

*U. S. Patent 2,762,726. Sept. 11, 1956.
A. E. Saunders, assignor to Pittsburgh Plate Glass Co.*

A method of producing a metal film on a refractory base having a metal oxide film of the class consisting of tin oxide, cadmium oxide, indium oxide, zinc oxide, combinations thereof, and films containing at least 70 to 80% by weight of tin oxide combined with minor amounts of at least one oxide from the group consisting of the oxide of antimony, copper, thallium, vanadium, chromium manganese, cobalt and titanium, thereon, which comprises subjecting the metal oxide film to the action of a metal, an aqueous acid solution of a carbonyl compound, said metal taken from the class of metals more electropositive than the metal of the metal oxide film consisting of zinc, cadmium, iron and aluminum, and said acid taken from the class consisting of hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, phosphorous acid, and sulfurous acid, the proportions of said acid and carbonyl compound being from 0.5 to 10 mol equivalents of acid to each mol of carbonyl compound.

Black on Nickel and Iron Alloys

*U. S. Patent 2,762,733. Sept. 11, 1956.
P. Borghetti and W. R. Cavanagh, assignors to Parker Rust Proof Co.*

A composition for producing black coatings on surfaces of steel, iron, nickel and iron-nickel alloys which comprises an aqueous acidic solution comprising as the essential coating producing ingredients 5 to 100 grams/liter of the phosphate ion, at least about 0.125% of the ferrous ion, at least about 0.1% of a first metallic ion selected from the group consisting of zinc, manganese and cadmium ions, said first ion being present in an amount sufficient to form metallic phosphate with the major portion of said phosphate ion, about 0.0006% to

0.012% of the sulfide ion and a second metallic ion distinct from first metallic ion which forms a black sulfide and which will not oxidize the ferrous ion in said aqueous acidic solution, the total metallic ion content being greater than about 0.5%.

Cleaning & Conversion Coating

*U. S. Patent 2,762,732. Sept. 11, 1956.
R. I. Somers, assignor to Parker Rust Proof Co.*

A method of treating the surface of a metal of the class consisting of iron, aluminum and zinc and the alloys thereof, and chemically coated metallic surfaces which comprises applying to the said surface, a solution containing as essential ingredients 40 to 90 parts by volume tertiary butyl alcohol, 10 to 60 parts by volume of a hydrocarbon solvent, up to 30 parts by volume water, and .025% to 10% chromic acid by weight of the total weight of the solution and drying a film of said solution upon the surface.

Electroforming

*U. S. Patent 2,762,762. Sept. 11, 1956.
D. J. Donahue, assignor to Radio Corp. of America.*

A method for electroforming an article in a copper plating bath comprising maintaining the composition of said bath between the following limits:

CuSO ₄	100 to 250 grams per liter
H ₂ SO ₄	Sufficient to adjust pH to 1.5 to 0.2
Chloride ion ..	.025 to .045 gram per liter
Water	Balance

immersing a body having a surface of a noble metal in said bath, passing an electric current through said bath and said surface in a direction to make said surface a cathode at a rate of 5 to 70 amperes per square foot of the area of said surface, maintaining the temperature of said bath at 10°C. to 50°C., and removing the resulting copper deposit from the cathodic surface.

Wire Plating Process

*U. S. Patent 2,762,763. Sept. 11, 1956.
H. Kenmore and W. J. Manson, assignors to National-Standard Co.*

In a method of electroplating wire, the steps comprising continuously passing said wire to a drawing die of smaller diameter than said wire so that the said die is adapted to hold the wire to permit the wire passing therethrough to be tensioned sufficiently to reduce

the size thereof, applying sufficient tension to the wire coming from said die to reduce the size thereof, said tension being applied at the end of a substantially unobstructed, straight, horizontally-spaced path from said die, continuously electroplating said wire while under said tension and while traveling in said unobstructed path, and maintaining the wire in substantially continuous vibration by intermittently striking the wire to cause it to vibrate all along said substantially unobstructed path at the natural vibration frequency of the wire as determined by length and the high tension of drawing of the wire.

Molten Bath for Depositing Aluminum

*U. S. Patent 2,762,764. Sept. 11, 1956.
C. J. Owen, assignor to U. S. Steel Corp.*

A method of electrolytically depositing aluminum on continuous steel strip comprising passing the strip at speeds of 400 to 1000 feet per minute through an anhydrous molten salt electrolyte containing anodes of aluminum metal, said electrolyte consisting by weight of the following:

	Per cent
Aluminum chloride	60 to 90
Alkali metal chloride	9.5 to 39.5
Alkali metal fluoride	0.5 to 7

and maintaining the electrolyte temperature at 450° to 650°F. and a current density between the strip and the anodes of 200 to 500 amperes per square foot.

Electropolishing Steel

*U. S. Patent 2,762,766. Sept. 11, 1956.
Bo-Shin Ro, assignor to Khe-Beng Chiong.*

A method of electropolishing high speed steel which comprises contacting the steel with a solution consisting of 100 parts concentrated nitric acid s. g. 1.52, 4 parts hydrofluoric acid containing not less than 50% hydrofluoric acid and 2 parts potassium dichromate, at a temperature of 15°C. and at a potential of 10 volts with a current density of 120 amperes per dm.² for 60 seconds, removing the parts and washing the same.

Plating Barrel

*U. S. Patent 2,762,772. Sept. 11, 1956.
W. H. Jackson, assignor to The Udy-lite Corp.*

In an electroplating machine for

electroplating articles in bulk having a perforated barrel rotatably supported at each end for supporting the articles in the plating bath during the plating operation, a flexible cathode lead fixed at one end and projecting into the barrel through an end thereof at its axis of rotation, said flexible cathode lead having an insulating cover terminating short of the end thereof, a free moving uninsulated cathode contact knob at the end of the cathode lead for electrical contact with the articles being plated, and an arc preventer in the form of a length of flexible link chain secured substantially at its center in electrical conducting relation to said cathode knob to provide a plurality of cathode contact points on both sides of said contact knob whereby said knob makes continuous electrical contact with the articles being plated during its movement among said articles.

Belt Polisher

U. S. Patent 2,763,103, Sept. 18, 1956.
S. Bader.

An endless abrasive belt polishing and grinding machine.

Flexible Abrasive Brush

U. S. Patent 2,763,104, Sept. 18, 1956.
E. R. Lindenberg, assignor to Anton Vonnegut.

An abrasive brush comprising a stem formed of a number of twisted wires and an abrasive sheet disposed between said wires and folded in a series of pleats, said wires holding said sheet in a spiral form with the pleats extending transversely of said wires to permit twisting distortion of said sheet.

Burnishing Wheel

U. S. Patent 2,763,105, Sept. 18, 1956.
J. L. Feeley, assignor to Westinghouse Electric Corp.

A burnishing wheel comprising a rotatable body having a circular periphery, said body consisting essentially only of a plurality of superimposed laminations of glass fiber fabric and a thermoset resinous binder impregnating and bonding together the glass fibers in each fabric laminate and for binding the laminated fabric into a solid body capable of rotating at a speed such that the periphery of the body moves at a rate of from 9,000 to

14,000 feet per minute, the glass fibers comprising from 50% to 60% of the weight of the body and the balance being the thermoset resinous binder, and said glass fibers being exposed at the periphery for burnishing contact with members applied thereagainst.

Gas Plating

U. S. Patent 2,763,576, Sept. 18, 1956.
H. G. Belitz and O. F. Davis, assignors to The Commonwealth Engineering Co. of Ohio.

The method of plating steel shafts with molybdenum metal deposited from a heat-decomposable metal vapor which comprises the steps of restricting the free access of air to a limited surface area of the shaft to be plated, establishing a source of heat-decomposable molybdenum metal vapor in the form of a jet under pressure onto said limited surface area to be plated, said metal vapor consisting of hydrogen and molybdenum carbonyl, and subjecting said area to localized heating to raise its temperature thereof to between about 350°F. and 425°F. to cause said impinging metal vapor to decompose said deposit molybdenum



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metal onto said limited surface area, and removing the decomposition products under conditions to maintain mixing of air into the exhaust stream to a minimum, said removal taking place in a direction opposed to that of said given direction.

Copper-Lead Bath

U. S. Patent 2,763,606. Sept. 18, 1956. W. G. Hespenheide, C. L. Faust and B. J. Esarey, assignors to American Brake Shoe Co.

A copper-lead alloy electrodepositing bath for depositing lead copper simultaneously and consisting essentially of an aqueous solution of soluble complex copper cyanide and free cyanide, alkali metal hydroxide, and complex lead gluconate.

Aluminum Bath

U. S. Patent 2,763,605. Sept. 18, 1956. M. A. Miller and C. D. Baker, assignors to Aluminum Co. of America.

An electrolyte for electrodepositing aluminum consisting essentially of at

least one aluminum halide from the group aluminum chloride and aluminum bromide, guanidine hydrochloride, and at least one aromatic hydrocarbon from the group benzene, toluene and xylene, the mol ratio of aluminum halide from the group mentioned to guanidine, hydrochloride, lying between 1.7:1 and 2.9:1, and the mol ratio of aromatic hydrocarbon from the group mentioned to guanidine hydrochloride being at least about 0.4:1.

Wall Mounted Blasting Gun

U. S. Patent 2,763,964. Sept. 25, 1956. R. L. Luce, assignor to The Hydro-Blast Corp.

A blasting gun comprising a supporting arm, means for mounting the supporting arm in an opening in a mounting wall for pivotal movement about a horizontal axis in a vertical plane and about a vertical axis in lateral planes perpendicular to said vertical plane, a nozzle pivotally carried by one end of said arm, actuator means operatively connected to said nozzle to effect pivotal movement of the nozzle

relative to said arm in a vertical plane, bracket means rigidly secured to the mounting means, adjustable means connecting the bracket means to the supporting arm to hold said supporting arm at an adjustable angle of inclination about said horizontal axis, and drive means connected to the adjustable means and operative to vary said angle of inclination.

Tin Thickness Testing

U. S. Patent 2,763,784. Sept. 18, 1956. R. R. Webster, assignor to Jones & Laughlin Steel Corp.

Apparatus for measuring the thickness of a metal coating on a metal base comprising means for generating and irradiating a specimen with a beam of X-rays adapted to excite in the metal base fluorescence which is absorbed in the metal coating.

Portable Abrasive Blaster

U. S. Patent 2,763,965. Sept. 25, 1956. R. A. Stokes.

A portable abrasive containing and feeding apparatus comprising a chas-

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...s, ground engaging wheels on said chassis, means on said chassis for coupling the same to a towing vehicle, a supporting frame extending upwardly from said frame, a pair of abrasive containers mounted on said frame.

Corrosion-Inhibiting Compositions

U. S. Patent 2,763,614. Sept. 18, 1956.
T. L. Cantrell, D. Hill and E. E. Fisher,
assignors to Gulf Oil Corp.

A bright, stable corrosion-inhibiting composition comprising about 49 to about 88 per cent by weight of the composition of a mineral oil base, and having incorporated therein from about 5 to about 15 per cent by weight of water, from about 0.25 to about 2.5 per cent by weight of an alkanol amine selected from the group consisting of primary, secondary and tertiary alkanol amines whose alkanol substituents contain from 2 to 3 carbon atoms, from about 0.1 to about 1.0 per cent by weight of a salt of a primary aliphatic amine containing from 8 to 18 carbon atoms and a dialkyl ester of orthophosphoric acid, the alkyl substituents

of which contain from 3 to 10 carbon atoms, from about 1 to about 10 per cent by weight of an alkali metal salt of an oil-soluble sulfonic acid, from about 0.75 to about 7.5 per cent by weight of a fatty acid containing from 12 to 24 carbon atoms, the fatty acid: alkanol amine mol ratio being in excess of 1:1, a total of about 5 to about 15 per cent by weight of a coupling agent selected from the group consisting of 2-butoxyethanol and mixtures thereof with butanol, the 2-butoxyethanol being present in an amount of from about 1 to about 15 per cent by weight, and the butanol being present in an amount of from about 0 to about 14 per cent by weight.

Buffing Compound Applicator

U. S. Patent 2,763,971. Sept. 25, 1956.
N. C. Andersen, assignor to Schlage Lock Co.

In an applicator for applying abrasive to a rotating buffing wheel, a body of soft, friable buffing material in the shape of a solid of revolution, a pair of supporting members supporting said

body at opposite ends of its axis of revolution, said body being formed at said opposite ends to partially receive said members therein with the latter projecting oppositely outwardly therefrom, and means supporting said members for rotation about said axis with said body, said means being provided with removable portions to permit removal of said body with said members from said means in a direction radially outwardly of said axis.

Hot Galvanizing Apparatus

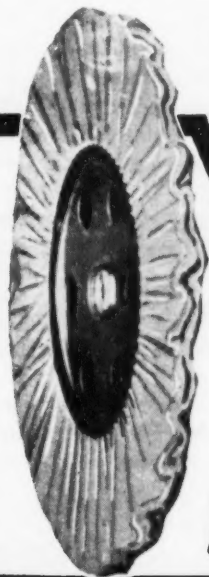
U. S. Patent 2,764,124. Sept. 25, 1956.
D. J. Reed and G. W. Kennedy, assignors to A. O. Smith Corp.

Apparatus for the automatic galvanizing of the inside of metal tanks and cylindrical articles without galvanizing the outside thereof.

Scrap Detinning Machine

U. S. Patent 2,764,473. Sept. 25, 1956.
C. J. Klein and W. H. Wright, assignors to National Steel Corp.

Apparatus for treating material comprising, in combination, tank means



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adapted to hold a bath of solution for treating the material, an elongated drum adapted to hold the material, means supporting the drum in the tank, means for rotation about the longitudinal axis of the drum, the drum including a substantially cylindrical side wall and spaced apart end walls.

Method of Plating Chromium Over Antimony

U. S. Patent 2,764,538. Sept. 25, 1956.
C. F. Smart, assignor to General Motors Corp.

A method of electrodepositing a bright coating of chromium on an article having an outer surface of a metal selected from the class consisting of antimony and antimony base alloys which

comprises immersing said article for a period of time not in excess of one minute in a chromic acid base chromium plating bath maintained at a temperature of from 110°F. to 160°F. while no electrical current is passing through the bath and then electrodepositing bright chromium on the article in a chromic acid base chromium plating bath.

Electropolishing Method

U. S. Patent 2,764,540. Sept. 25, 1956.
W. G. Farin, P. F. Duddy and G. A. Nelson.

The method of electropolishing the inside of an elongated substantially tubular body the ends of which occupy different heights which consists in cir-

culating an electrolytic liquid under pressure through the substantially tubular body to be electropolished and through fluid storage spaces in communication with the ends of the tubular body and through a pipe system joining said fluid storage spaces.

Continuous Electrolytic Treatment

U. S. Patent 2,764,542. Sept. 25, 1956.
A. N. D. Pullen, assignor to The British Aluminum Co., Ltd.

Apparatus for the electrolytic treatment of articles composed of a plurality of metal elements of relatively large surface area electrically connected one to another by a metal wire of relatively small cross-sectional area comprising in combination an electrolytic tank for containing a main volume of electrolyte, at least one electrode being located within said tank, means electrically connecting said electrode to one pole of a source of electric current, a chamber for containing a segregated volume of electrolyte and adapted for passage therethrough of a run of articles, said chamber having a wall in contact with the main volume of electrolyte and apertured for passage of the articles therethrough with clearance and directly into the main volume of electrolyte within the tank, at least one electrode in said chamber and means connecting said electrode to the other pole of said source.

ABSTRACTS

Working Diagrams for Copper Baths With Periodic Current Reverse

W. Nohse: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 9, p. 425.

The calculation of the copper coating thickness produced in modern hot copper baths with periodic current reverse presents certain difficulties and similarly, the calculation of the current density to be applied for a given coating thickness. The current interruption and anode switching time has an appreciable influence on the current efficiency figure and although the contrary is asserted, the author considers that this cannot be made good by increasing the current density. This can be done theoretically but in practice,

questions of equipment limits and costs set certain limits to this.

The author gives a mathematical treatment of the periodic current reverse plating cycle, in terms of current, time, metal deposited etc., and develops diagrams and curves from these equations. A working diagram is presented which can serve as a nomogram to the practical technician, from which can be read off directly the various practical data required for the operation of this plating schedule. In the treatment consideration is given to the action of the time factor of the anodic polarization and the effect of the current interruption with copper baths on the current efficiency figure. The working Nomogram chart presents graphically the relationships of current density, pure cathodic current efficiency, plating deposition speed and the ratio of the current direction change-times. Examples of calculations in practice from this diagram and tables of data are also given.

Electrolytic Copper-Cleaner Process

E. T. Richards: *Metallwaren Industrie und Galvanotechnik*. Vol. 45, No. 2, p. 76.

The author states that it is frequently of advantage with steel parts, to use a copper containing electrolytic cleaning bath. With this, a thin copper film separates out on the perfectly clean metallic surface, proof of the complete cleansing of the coppered areas. This guide to the adequacy of the cleaning is a better one than that of the water-break method, which is difficult to recognize with the smaller areas. A further advantage of this process is that, through the coppering, after-rusting of the cleaned surfaces is avoided, if the cleaned parts cannot be immediately finished.

A disadvantage of the process is that it cannot be employed if electrically conductive impurities are present on the surface. For instance, if black iron oxide is present on the iron or steel surface, this is also coated by the copper film. However, as the oxide only has a low adhesion and, with subsequent plating, will be loosened on bending, trouble will be caused. The treatment time in this bath should be short and not longer than 1-2 minutes. Other metals can also be treated.



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Modern Mass Plating Techniques

A. Neumann: *Metallwaren Industrie und Galvanotechnik*. Vol. 45, No. 12, p. 577.

The author first discusses the design of modern barrel, cylinder, and barrel-cylinder units for mass plating of small parts. All these three types of units have their respective advantages and disadvantages. One feature which will decide whether a particular type of apparatus can be used with a certain electrolyte will be the deciding factor of temperature. Thus, with the barrel plating unit, one difficulty is the fact that, with the necessary high current densities which are employed and the

necessarily small volume of electrolyte, a considerable heating effect is produced and this may be adverse in some cases. Again, some electrolytes require to be operated hot and this, again, is a difficult matter to arrange with a barrel unit. With the cylinder plating unit, which is arranged to work with a rotating horizontal cylinder semi-immersed in a normal plating tank, temperature control and regulation can be installed and this difficulty does not arise.

A further serious disadvantage of the barrel plating unit is the lack of any possibility of applying a sufficiently large anode surface. With the "older" plating processes this already in-

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introduces serious difficulties and, with the modern high speed plating processes, operation becomes quite out of the question. As soon as baths operating at high current densities are used in barrel plating units, the following disadvantages are encountered. The anode surface is definitely too small, with the result that the anodes passivate and the current becomes restricted after a short time.

One advantage that the barrel plating unit has over the cylinder plating type of apparatus is that, with the latter, with some parts, such as screws and nuts with fine threads, small parts with sharp edges, etc., the mechanical treatment in the horizontal cylinder

unit is too severe and can be damaging. The barrel plating unit, with its inclination is much more gentle and some parts can only be plated in the barrel unit. Furthermore, the barrel plater has the additional advantage that the inclination can be varied to give the most favorable effect.

However, to combine the advantages of both units and to avoid their disadvantages, there has been evolved what is termed the barrel-cylinder plating unit. As the name implies this is a combination of both types and the plating unit has been developed specially to utilize the modern high speed plating baths. When plating, the barrel, similar in shape to that of the

normal barrel plater, is tipped at an angle into the plating tank containing the electrolyte, on top of which it is fixed. The barrel is made of suitable material, such as plastic; the anodes are fixed on the side of the tank, outside the barrel. In a 160 liter tank it is possible to apply a 32 sq. dm. effective anode surface. The barrel will take up to 8-10 kg. of ware. With these figures and a current density of 160 amps., an anodic current density of barely 5 amp./sq. dm. is applied. The electrolyte can be held at the required temperature by heating or, for example with a bright zinc bath working cold, a cooling coil can be placed in the tank. The barrel, of course, rotates during plating, and its angle of inclination can be adjusted. The barrel is very easily discharged by raising and tipping out in the usual manner.

One considerable advantage of the cylinder plating unit is that the same ware container, i.e., the drum, with suitable handling arrangements, can process from one stage to another, passing in and out of different tanks, such as cleaning, rinsing, plating, etc., without the necessity for handling the ware, after the cylinder has been charged, until it is finally emptied after the last rinse, several cylinders can also be placed in one tank; this makes for considerable production elasticity and smooth working.

Control Analysis of Brass Plating Baths

W. Bries: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 9, p. 429.

Brass plating baths contain, as the chief constituents, copper, zinc, potassium or sodium cyanide, and sodium carbonate, or caustic potash. A newly prepared bath should always be analyzed immediately and the values found should then be held constant. When taking the sample for analysis, the bath should be well stirred, then a sample of about 100 cc. is taken out and filtered. If the filtrate is not clear, the filtration should be repeated. The author then gives detailed information regarding the determination of the copper content, the free sodium or potassium cyanide, determination of the total sodium cyanide or potassium cyanide, calculation of the zinc content, determination of the sodium or potassium carbonate content, and lists the apparatus and chemicals required to

conduct these analyses. The determination of the zinc and of the carbonate content of the bath is then considered in further detail.

Stripping Plated Coatings

E. Mueller: *Draht*. Vol. 5, p. 379.

For various reasons, it is often necessary to remove plated coatings from the basis metal. There are three possible ways to accomplish this: mechanical removal of the coating, as by grinding, chemical solution, and electrolytic stripping. As to the choice of a particular method to be applied to any given case, the characteristics of the basis metal, the nature and thickness of the coating will be influencing factors, together with the consideration that the basis metal should be attacked as little as possible during the stripping process.

Basis metals comprising steel, aluminum alloys, and zinc and copper alloys can be treated by means of the chemical stripping methods. For the ferrous metals, acid solutions are best although, with alkaline solutions, the basis metal is not attacked. Consideration must be given to hydrogen generation and diffusion into the basis metal with the use of the acid solutions. A high working speed is always preferable. Accordingly, the baths should not be allowed to get into too great a depleted condition. Sometimes the intermediate coating (i.e. nickel) is not removed when the top coating is dissolved (such as chromium); in such cases a special bath must be provided to deal with the intermediate coating.

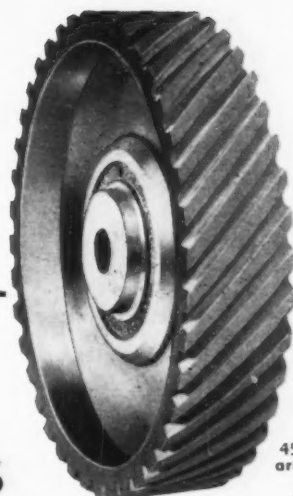
Not all metal plating baths are suitable for electrolytic stripping. One difficulty is that the basis metal will also dissolve with anodic treatment, or else thick oxide coatings will be formed because of the oxidizing condition at the anode. Consequently, those electrolytes must be used in which the basis metal will not dissolve. Solutions for stripping are available which have general suitability, thus for steel, copper and zinc alloys. A considerable amount of practical experience is necessary to conduct these stripping processes successfully, particularly with the noble metals.

Tables are given, which present the various solutions and bath operating conditions to be employed with different plated coatings and various basis

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metals; also the solutions and procedures to be adopted with compound plated coatings, such as copper-nickel-chromium on steel.

Analysis of Nickel Baths

W. Briese: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 7, p. 328.

The normal Watts baths, in addition to organic brighteners and wetting agents, contain as the chief constituents nickel sulfate, nickel chloride, and boric acid, sometimes also magnesium sulfate. The bath analysis becomes more difficult when sodium sulfate and sodium citrate are also present. The author gives details of the analytical control of the normal Watts type bath.

For the analysis, a 50 cc. sample is taken from the bath. For the nickel determination, a 5 cc. sample of the bath is taken, and details are given of the determination by titration with sodium cyanide solution.

The nickel chloride, sodium chloride, or ammonium chloride, are titrated with decinormal silver nitrate solution. The nickel sulfate, in baths which contain no sodium or ammonium chloride, but only nickel chloride (practically all the bright nickel baths and Watts type baths), is obtained by calculation, from the nickel content and the nickel chloride content of the bath. The boric acid content is determined by titration with N caustic soda.

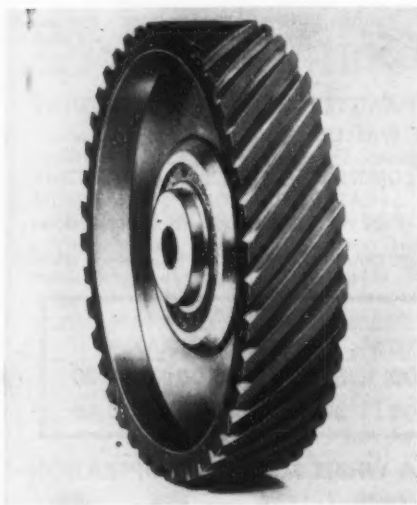
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Because of the new type of serration, the wheel has wider-than-usual lands providing more rubber surface for longer wear, but with no sacrifice of conformability or aggressiveness. The wheel has, in fact, more conformability than wheels with standard serrations, and leaves no mark on the work piece.

The wheel is available in a 14" diameter with 1", 2", 3" and 4" face widths, and in several durometers. It is believed, however, that 80, 55, 35 and 20 durometers will be suitable for most applications. To facilitate the selection of wheels for a given job,

harder durometer wheels are colored red, and the softer durometer wheels are silver-gray.

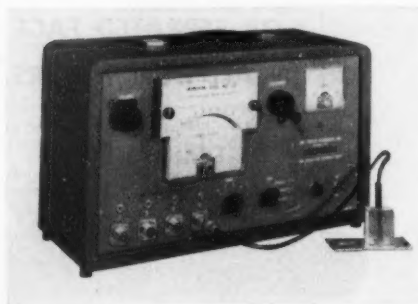
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MF, 61 E. 4th St., New York, N. Y.

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tanks. Even without agitation its ability to remove difficult soils is said to be excellent.

Used at 6 to 8 ounces per gallon of water, at temperatures between 160° and 180°F., solutions of the cleaner are claimed to be completely safe on aluminum and its alloys.

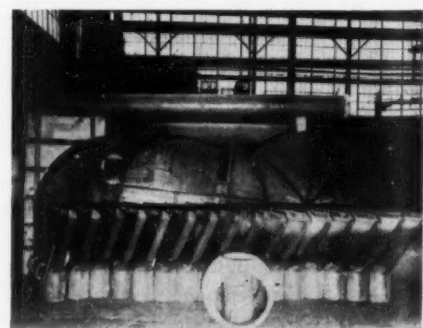
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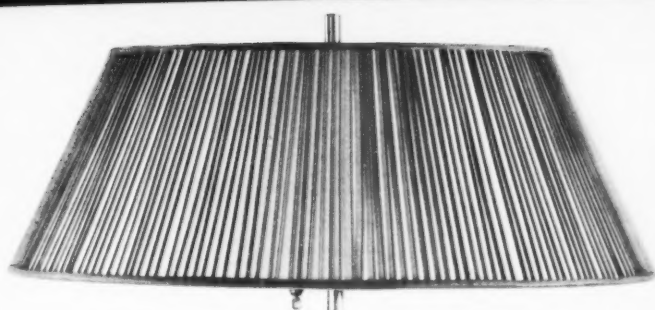
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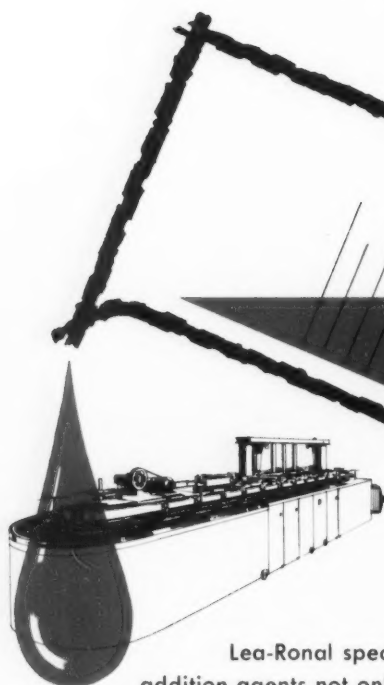
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- ... increase in allowable current density
- ... elimination of burning
- ... elimination of carbonate control
- ... bath less sensitive to variations in cyanide concentration
- ... much better plating than with conventional salts but at no more cost.

Yes,
all this
and more, too,

because Ultra-Tartral is one of the most carefully formulated and one of the most versatile addition agents for cyanide copper plating* to come on the market.

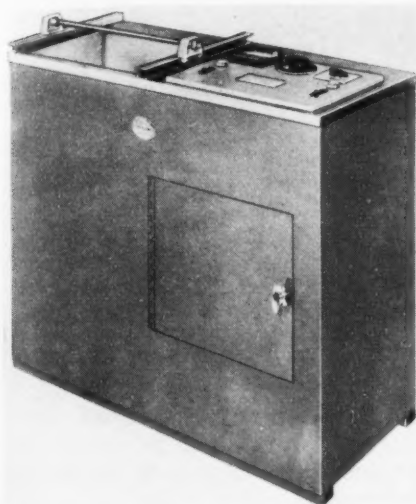


*Especially adapted to the Lea-Ronal Bright Copper Process

Are you interested in Buffing, Polishing and Burring Specialties? SEE OTHER SIDE OF THIS INSERT

Portable Electroplating Unit

Sel-Rex Corp., Dept. MF, 155 Manchester Place, Newark 4, N. J.



A new, extra large capacity "Jet Plater," the portable complete electroplating unit, has a capacity of one hundred gallons. The unit is completely automatic in operation and consists of a Sel-Rex selenium rectifier with automatic timer; stainless steel tank (which may serve as the anode) fitted with a water jacket for temperature control; a movable work rack which accommodates a portable plating barrel; a centralized control panel equipped with Weston ammeter and Powerstat control; a filter; and a drip-proof pump with motor.

According to the above manufacturer the design of the new unit permits the construction of custom-built units in much greater than one hundred gallon capacities, with no design or "tooling up" charges having to be paid by the eventual purchaser.

The name of the assembly is derived from the unique "jet" method of solution agitation which is accomplished through a pump and perforated stainless steel tube at the bottom of the plating tank. The resultant constant motion of the solution around the work, the manufacturer states, assures consistently smooth, even deposits, and high quality electroplating.

77/Circle on Readers' Service Card

Detergent for Buffing Compound Removal

Conversion Chemical Corp., Dept. MF, Rockville, Conn.

Kenvert Sluff-Off, a new synthetic detergent, is designed to remove buffing compounds by its unique anti-

staticising and synergistic properties of wetting the metal surface and reducing interfacial tension between metal and compound. Its unusual properties permit the compound to slough off in sheets. The detergent is suggested for use on either ferrous or nonferrous metals, and works equally well in hard or soft water areas. Ferrous parts treated in this new detergent have a tendency to resist rusting. It is also recommended for tubbing processes in the jewelry field, and further as a burnishing compound for zinc die castings.

The product should be used in steel tanks with steel coils and ventilation is required only if water vapors from cleaning solution are objectionable. Standard packaging is 5 gallon pails

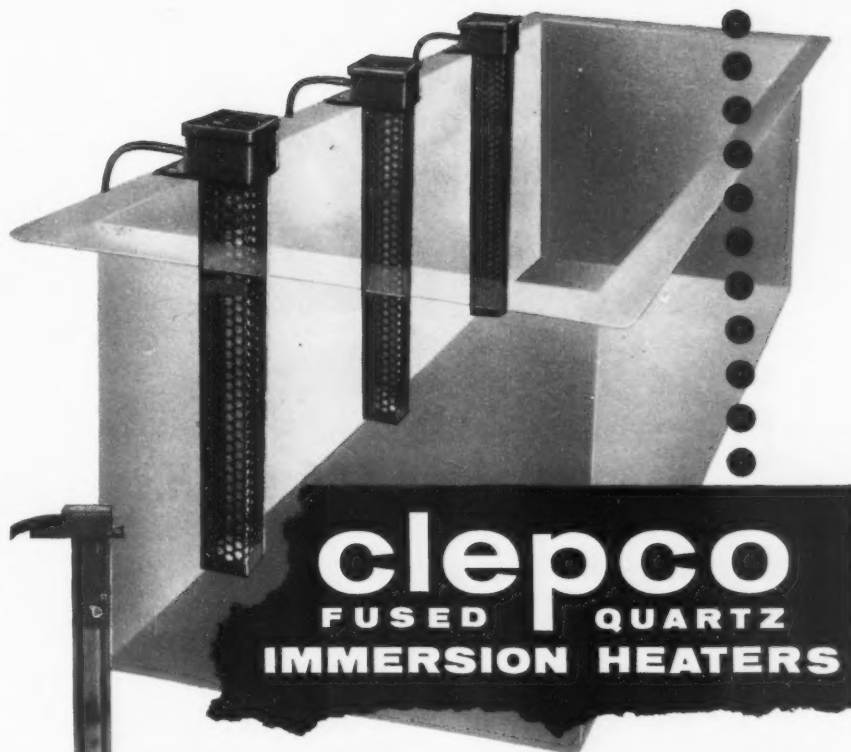
and weight is approximately 9-1/2 pounds per gallon.

79/Circle on Readers' Service Card

Washing and Processing Machine

The Alvey-Ferguson Co., Dept. MF, 1223 Disney St., Cincinnati 9, O.

This fully automatic cabinet type machine with its "traveling wash carriage" was especially designed for cleaning and processing large, odd-size metal products. For cleaning, the machine is equipped with automatically-timed wash and rinse cycles. These can be pre-set for any desired time periods and the operation is automatic. A signal light indicates when the operation is completed. Cleaned at an elevated



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The Sparkler Plater's-Pal will handle all acid and cyanide solutions (except chromic acid and high chloride nickel).

The Sparkler PLATER'S-PAL will filter

Arsenic Cyanide
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Bronze Cyanide
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Tin Stannite
White Brass Alloy
Zinc Cyanide
Acid Copper Sulphate
Acid Zinc
Black Nickel Acid
Cadmium Fluoborate
Copper Fluoborate
Lead Sodium Fluoborate
Lead Sulfamate
Nickel
Palladium
Tin Fluoborate
Tin Nickel Alloys

Sparkler plating filters are used in some of the largest plating plants in the world.



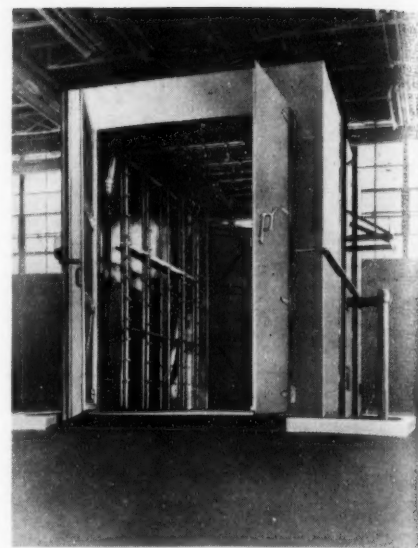
- ★ Only clean solution flows through the pump—no excessive pump wear.
- ★ Visual inspection of all parts including filter plates possible without dismantling filter.
- ★ All solution reclaimed.
- ★ Completely enclosed but with easy access to operating parts.
- ★ Cover locks and unlocks with one quick opening connection—no cover bolts, no complicated sealing devices.
- ★ Can be cleaned and back in operation in 10 minutes.
- ★ Positive uniform quality of filtration at all times.

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temperature, the hot parts dry quickly on removal.

Combination cleaning and phosphate coating materials may be used in the wash tanks, and a small amount of chromic acid added to the rinse water provides a basic treatment that makes an excellent bond for paint. Separate wash and rinse piping assemblies mounted on reciprocating carriages supply full spray coverage from four sides. Individual pump and tank units are furnished for each solution. Solutions are returned to their proper storage tank by automatic drain sheets.

The machine is installed in a pit at "track level." Parts are loaded on specially designed trucks which are pushed into the cabinet. Removal may be made from the front, or the load may be advanced through the opposite end of the machine. The clearance of this particular unit will accommodate a loaded truck 4 ft. wide x 6½ ft. high and 10 ft. long.

81/ Circle on Readers' Service Card

Clear Primer for Plastisol

*The Stanley Chemical Co., Dept. MF,
East Berlin, Conn.*

Whether baked or air-dried, the new No. 69X-1406 clear primer provides excellent plastisol adhesion to metal. The company claims. The clear primer is transparent and colorless and can best be used under clear plastisol or for other applications where a colored primer would be objectionable.

Colored variations of the new primer are also available. As a white primer No. 67X-832, it gives outstanding humidity and hot water resistance. As a yellow primer, No. 66X-5457, it up-

grades, plastisol where resistance to corrosion and corrosion creep is required.

82/Circle on Readers' Service Card

Copper Bath Purifier

MacDermid, Inc., Dept. MF, Waterbury 20, Conn.

A new process for removing chromium from copper plating baths, known as "Chrome Removal Process," is available for use with the firm's Rocheltex copper, standard bright copper, and the new high speed Z/T bright copper baths. The new process involves treating the copper plating solution with two prepared materials, Metex Precipitator and Metex Reducer, then carbon treating and filtering. This process results in the complete removal of chromium contamination.

A distinct advantage of the new process is that the additive chemicals do not accumulate to build sufficient concentrations which would form bivalent copper and create side effects. If recontamination occurs, the process may be repeated without concern for such side effects.

83/Circle on Readers' Service Card

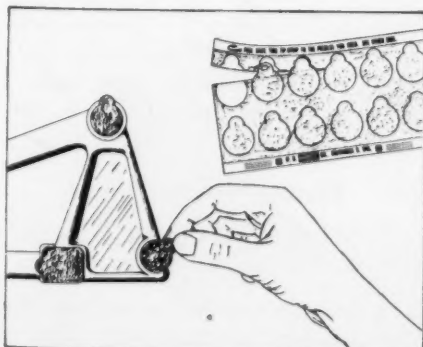
Tab Masks

W. H. Brady Co., Dept. MF, 727 W. Glendale Ave., Milwaukee 9, Wis.

This pre-cut, self-sticking mask is removed quickly and neatly by means of a non-adhesive tab which is part of the mask. The new TAB mask will speed finishing wherever pre-cut masks are used—spray painting, anodizing, vacuum-metalizing, etc.

The non-adhesive tab folds back out of the way when applied. To remove, merely grab the tab and pull. The new mask eliminates all use of tools or sharp instruments often used to remove masks from a finished piece. There is no danger of scratching or marring a fine finish.

The masks are pre-cut in any shape



now

you can get this
brilliant finish
directly on
zinc die castings!



NEW

IRIDITE® (Cast-Zinc-Brite)

brightens zinc die castings by chemical
polishing, protects against corrosion



NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for **FREE PROCESSING** for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. **IMPORTANT:** when you give us samples for test processing, please be sure to identify the alloy used.

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- Measures plated coatings on steel, brass, copper, zinc die-cast, aluminum, nickel-silver, bronze and other metals; also nickel on steel.
- Measures anodize and hard-coat on aluminum and magnesium; also paint, porcelain, organic coatings on non-ferrous metals.
- Measures metal coatings on plastics, ceramics and other non-metallic materials.
- Sorts or matches metals and alloys.
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- Special probes can be provided for measuring on internal diameters, small diameters and otherwise inaccessible areas.
- Only $\frac{1}{8}$ " circle area required for measurement.
- You get fast, accurate, direct readings plus versatility and portability.

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85/Circle on Readers' Service Card

to exact specifications. They can be furnished in a variety of masking tapes to suit most finishing conditions of temperature, bake cycles and materials. Low cost masks come mounted on handy dispenser cards for fast application and easy storage.

86/Circle on Readers' Service Card

Vacuum Metalizing Unit

Rochester Div., Consolidated Electrodynamics Corp., Dept. MF, 1775 Mt. Read Blvd., Rochester, N. Y.

A new vacuum system is now available for laboratory, pilot plant, and limited production use, and was designed primarily for laboratory coating of various materials with vapor-

ized metals. Known as the Type LC1-18A vacuum system, it features a high-capacity pumping system which reduces pumping time, and offers a complete line of standardized accessories for increased versatility.

The pumping system includes a three-stage oil diffusion pump and affords a choice of 13, 15, 27, or 130-cfm mechanical pumps for roughing and backing. These pumps are operated by circuit breakers and are interlocked to prevent improper sequencing. An 18- by 30-inch Pyrex bell jar is the work chamber. It seats on a baseplate which has holes for vacuum-gauge sensing tubes, filament heating electrodes, and optional accessories.



The system is equipped with roughing, backing, and air inlet valves, in addition to a water-cooled combination valve and baffle located above the diffusion pump to minimize backstreaming of oil vapors. To simplify operation, all controls are cabinet-mounted and easily accessible.

The unit, with a 13-cfm mechanical pump, is 114 inches high, 39 inches wide, 54 inches deep, and weighs 970 pounds.

87/Circle on Readers' Service Card

Top Coating for Vacuum Metalizing on Metals

Logo, Inc., Dept. MF, 12933 S. Stony Island Ave., Chicago 33, Ill.

A new top coat for vacuum metalizing all types of metals is claimed to have superior physical properties as compared to lacquer and enamel type coatings. M-241, a sprayed and baked material, is claimed to impart a mirror like brilliance. The hardness of this coating is between 7H and 9H pencil hardness. Abrasion resistance is claimed to be 48% better than average lacquer type coating used in vacuum metalizing. The humidity resistance equals 1,500 hours at 110°F., 100% R.H. Upon exposure to ultra violet light, it shows no tendency to yellow or darken.

88/Circle on Readers' Service Card

Plating on Aluminum

Northwest Chemical Co., Dept. MF, 3910 Roselawn Ave., Detroit 4, Mich.

A new improved zincate bath for the treatment of aluminum prior to

ating, "Alkalume Pre-plate," provides a bath that is effective and economical for any type of plating.

Features claimed for the process include the ability to deposit an extremely fine grained, uniform coating in one pass; elimination of adhesion problems; low surface tension resulting in faster draining and reduced dragout; tolerance for chromium which assures continuous operation and longer life. The chromium is converted to a harmless form that eliminates the disposal problem. The material is harmless to rack coatings and has no objectionable odor.

89/Circle on Readers' Service Card

Traveling Buffing Head

Hammond Machinery Builders, Inc.,
Dept. MF, 1601 Douglas Ave., Kalamazoo, Mich.

A new Traveling head, known as Model 50-108, travels with the work, providing more buffing time on areas that are difficult to reach. It can be used on straight-line conveyors and on certain continuous rotary automatic applications. As the work approaches the wheel, an air cylinder is energized for forward stroking variable up to 5". At the end of the stroke, the air cylinder returns the head to pick up the next piece of work. The speed of travel can be synchronized with the conveyor speed through a hydro-check cylinder which is also used to provide smooth forward movement.

A dovetail way provides horizontal adjustment and a handwheel is used for vertical adjustment of the column. Head can be rotated 360° around column and is readily positioned to the



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Tygon linings are really economical. Not necessarily from the standpoint of low first cost (which can be very misleading), but more important, they provide greater corrosion resistance — more positive protection, hence longer trouble-free service life. Tygon's outstanding resistance to oxidizing acids, alkalis, oils and greases make it suitable for jobs too tough for other lining materials to handle. Excellent dielectric properties guard against current loss. Non-oxidizing, flexible, and resilient, it resists aging, wear and abrasion.

257-E

Send for your copy of the
fact packed, illustrated Tygon
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Where solution visibility is important, Tygon white linings permit maximum visual quality control. Seamless, jointless Tygon linings are installed by a licensed Tygon applicator in your area, reducing delivery time and freight costs to a minimum.

Tygon is the perfect membrane for oversheathing with USSCO acid brick. Built-in-place tanks, tank piers and foundations are lined at your plant to your specifications by trained field applicators. And our engineering service stands ready to help with all your lining problems.

PLASTICS AND SYNTHETICS DIVISION

U. S. STONEWARE
AKRON 9, OHIO

90/Circle on Readers' Service Card

work. It can be used with buffs, set-up wheels, abrasive belts, and wire or tampico brushes. V-belt drive for 3, 5 and 7-1/2 HP motors can be supplied.

91/Circle on Readers' Service Card

Cleaning Process for Copper

Becco Chemical Div., Food Machinery and Chem. Corp., Dept. MF, Buffalo, N. Y.

A new surface-cleaning process for copper, both rolled and drawn products, is stated to greatly improve its bonding properties and to delay re-tarnishing. Instead of the usual acid-pickle, the new process employs a safer and more easily handled water-solution of ammonium persulfate at room tem-

perature, in which the copper is given a 30-second dip. Surface films are completely removed, a slight etch is imparted to the surface, and re-tarnishing is considerably retarded.

The pickling solution in the new process is only mildly acid and does not develop dangerous fumes or spray. Preliminary adhesion tests show excellent bonding properties for copper strip and wire which have been cleaned by the new process. And while tarnishing is certainly not entirely prevented, evidence so far accumulated shows that it will be delayed for as much as two weeks, which will be ample for most step-by-step processing of copper products.

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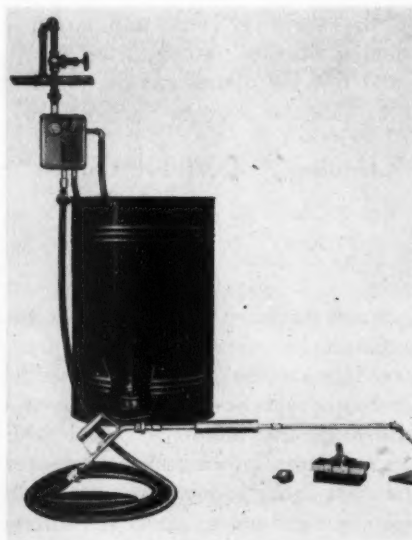
93/ Circle on Readers' Service Card

Steam Cleaning Unit

*Turco Products, Inc., Dept. MF,
6135 S. Central Ave., Los Angeles 1,
Cal.*

The Steamerette is an injector unit that uses existing steam supplies for steam cleaning, paint stripping, phosphating or sanitizing. The new product is said to provide complete steam cleaning facilities for a fraction of the usual cost.

The device is easily operated, requiring only the adjustment of one valve. It will operate in the range of 40-140 psi steam and has a powerful impinging force at all pressures within this range. A built-in pressure gauge indicates the operating pressure, elimi-



nates fluctuating, and assures uniform cleaning. Quantity and pressure of solution at the nozzle may be varied to provide every type of delivery, from a slow full stream at moderate temperature, to a hot driving blast for heavy cleaning.

The new steam gun is easy to install and economical to maintain. Since there are no pumps, motors or costly complicated equipment, maintenance is minimized. The unit will not clog or overheat, even under the most adverse operating conditions. It is quickly attached to any steam line maintaining an open pressure of 40 pounds or more. Easily portable, it can be quickly disconnected for removal to other parts of the plant where its services are required.

94/ Circle on Readers' Service Card

Thermo-Setting Plastic Flooring

*United Laboratories, Inc., Dept. MF,
16801 Euclid Ave., Cleveland 12, O.*

Certified thermo-setting plastic is a floor surfacing highly resistant to oils, greases, solvents, all organic acids, juices, and most inorganic acids. It needs no bond or sealer, adheres tenaciously to old base of concrete, brick, steel, wood, mastic, glass, or other surfaces.

It is easy to apply, easy to clean, rugged in its resistance to traffic, and has an attractive warm gray color.

A medium grading of aggregate; a unit covers $\frac{1}{4}$ " thick, about 20 square feet. Finishes with a slightly pebbled grain finish. A fine grading of aggregate; a unit covers $\frac{1}{8}$ " thick, about 35 square feet. Finishes with a smooth skid-resistant finish. Temperature should be above 50°F. although application may be made at lower temperature by providing heat from a heat lamp or other source.

A Unit consists of 3 parts: A liquid setting agent (A), a liquid resin (B), a dry chemically inert graded aggregate (C). All are separately packed in a compartmented 5 gallon pail.

95/ Circle on Readers' Service Card

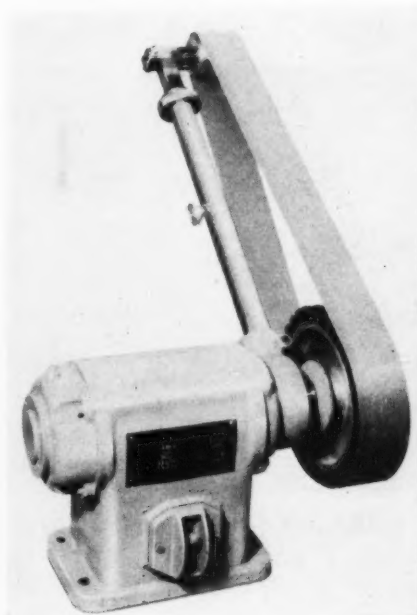
Bench Grinder

Curtis Machine Div., The Carborundum Co., Dept. MF, Jamestown, N. Y.

The new Model DBA-O bench grinder is lightweight and compact, and is available in both single or three phase current. The 6" diameter, 2" wide contact wheel is driven by a 0.6 HP motor

developing a speed of 5,100 s.f.m. By use of direct drive of the contact wheel there is no loss of power or speed of the abrasive belt. The speed provides quick, cool stock removal on all applications such as: grinding, polishing and deburring. The idler arm incorporates belt tracking and tensioning mechanisms and can be rotated 360° around the spindle to provide operation in any position. The standard abrasive belt size is 2" wide by 48" long.

For squaring, chamfering, and bevelling, a platen attachment is available at a slight additional cost. This platen is attached directly to the idler arm and maintains its relationship to the



abrasive belt without adjustment regardless of the position of the arm.

96/ Circle on Readers' Service Card

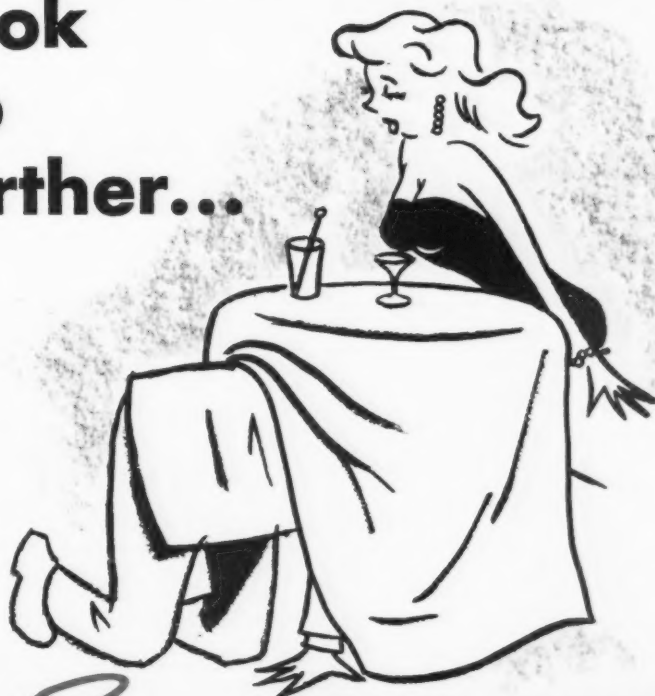
Protective Treatment for Brass

Logo, Inc., Dept. MF, 12933 S. Stony Island Ave., Chicago 33, Ill.

Brasslyfe is a process that passivates and protects brass in one application, according to the above manufacturer. An air dry spray material, it is claimed to passivate brass and prevent tarnishing and finger stains from appearing after the parts have been shipped. It is also claimed to produce a hard, tough, durable coating that shows excellent weather and humidity resistance. It can be sprayed, dipped or brushed and, while chemical reactions continue for several days, parts can be packaged within an hour after application.

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You'll find what you're looking for in metal finishing compounds when you look to Rutley. Rutley burnishing, tumbling and cleaning compounds are superior because Rutley makes a *specialty* of developing and formulating products *exclusively* for the metal finishing industry. For unusually fine finishes, more consistent performance, and substantially less rejects *try* Rutley compounds . . . they cost you *less* because they save so much valuable production time.

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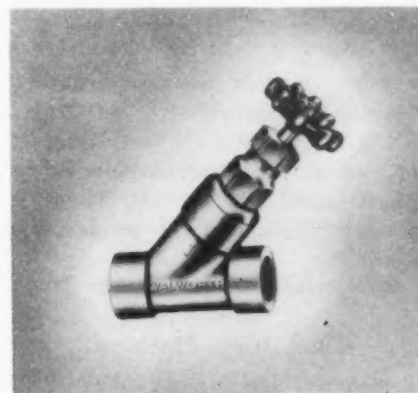
98/ Circle on Readers' Service Card

Corrosion-Resistant Valve

Walworth Co., Dept. MF, 60 E. 42nd St., New York, N. Y.

The first all-plastic Y-globe valve with full flow passage is made of rigid polyvinyl chloride. The new PVC valve provides tight shutoff and flow control of alkalis, acids, inorganic salt solutions and other corrosive fluids.

A special bonnet and gland nut design provides an absolute leak-proof unit. Because of its sturdy construction, the valve will operate successfully at pressures up to 150 psi at 75°F. An all-plastic assembly increases its durability. Each part is resistant to outside corrosion from plant fumes, drippings



and other atmospheric hazards. Life of the valve's packing is prolonged through a tapered back seat on the stem which permits repacking under pressure. The same design also reduces

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eliminates peeling of the container in application.

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Foil lined,
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THE ATLANTIC COMPOUND CO.
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pressure on stem packing when valve is opened completely.

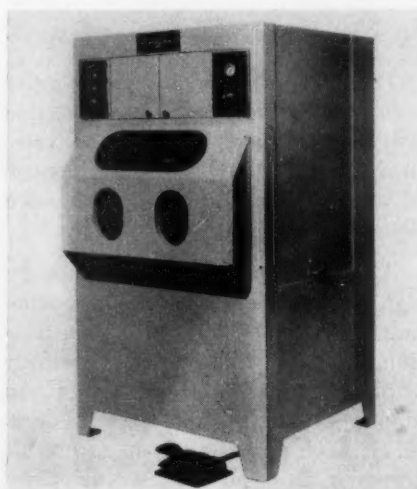
The valve is available with threaded and solvent-weld socket-type ends for 1-inch pipe. Other sizes, from 1/2 through 2 inches, will be available soon.

100/Circle on Readers' Service Card

Wet Blast Machine

*Clementina Ltd., Dept. MF, 2277
Jerrold Ave., San Francisco 24, Calif.*

The new Clemco Lik-Wid Hone is claimed to be the simplest yet the most efficient wet pressure blaster in use today. A press of a button starts the



agitation of the slurry immediately, no matter how long it has been standing idle.

Distinct advantages include visibility with wide window and foot controlled window washer; the fast changeover of abrasive with drain, plus pump action cleans the unit in a matter of minutes.

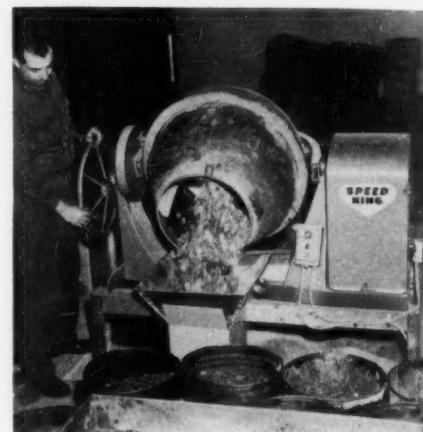
The installation consists merely of attaching a 1" air line and 1/2" water line, plus 220 V 3 ph and 110 V electrical connection.

101/Circle on Readers' Service Card

Low Cost Tumbler

*Speed King Mfg. Co., Div., The
Jaeger Machine Co., Dept. MF, Colum-
bus 16, Ohio.*

An electric-powered tilting drum



mixer costing less than \$400, originally designed for mixing concrete, has proved ideally adapted for low cost tumbling of small brass and stainless steel parts. Not only does the mixer cost less than conventional machines designed for this type of work, it has a larger capacity. Its 7 cu. ft. drum cleans O rings, C rings, etc., and discharges them into containers, ready for shipping. The drum is coated with automobile undercoating material to reduce noise to a minimum.

102/Circle on Readers' Service Card

Ball Transfer Conveyor

*Metzgar Conveyor Co., Dept. MF,
412 Douglas St., N. W., Grand Rapids,
Mich.*

Nylo is the trade name of a new ball-transfer unit which the above manufacturer claims lasts 10 times longer than the conventional all metal units. The diagrammatic drawing in the illustration shows how the new design (pat. pending) differs from conventional designs of ball transfer units by



having the bottom of the retaining cup entirely open to permit continuous self clearing and prevent clogging. The cup is designed to support the ball on friction-reducing protrusions that require no lubrication, and the cup is slotted to permit the ball to be snapped in or out without tools for total cleaning. The entire unit has proved in tests to be impervious to all food acids, steam cleaning, salt brine, detergents, mild acids, alkalis, oil, sand, grit and all weather conditions. Standard units are designed for pressure mounting in $\frac{3}{16}$ " H. R. steel plate.

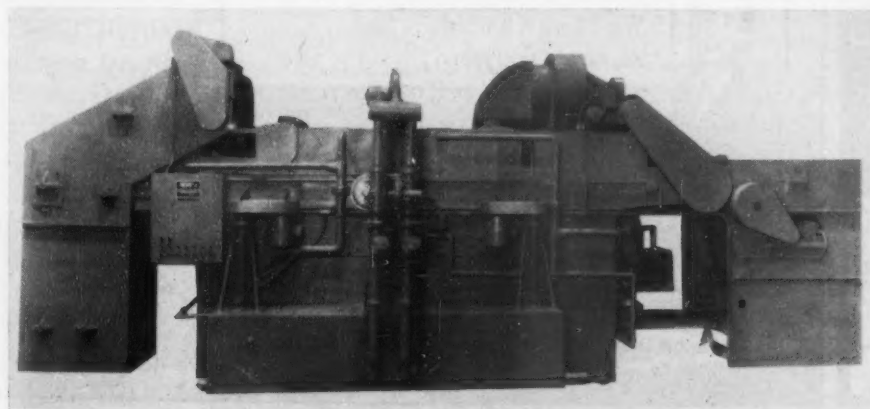
103/Circle on Readers' Service Card

Automatic Cleaning Machine

Ransohoff, Inc., Dept. MF, N. Fifth St. and Ford Blvd., Hamilton, O.

A new automatic work and tote pan cleaning machine does the work of two machines, saves 50% on floor space, prevents mixing of work and reduces manual handling. The machine is widely adaptable for any parts handled in tote pans, boxes and similar containers. It receives tote pans of work, dumps the work into a drum type washing section, then carries the upside down tote pan through an integral conveyor type washing section above the drum section where work is processed. Both work and tote pans are washed, rinsed and dried. Tote pans return to the discharge end of the machine ahead of

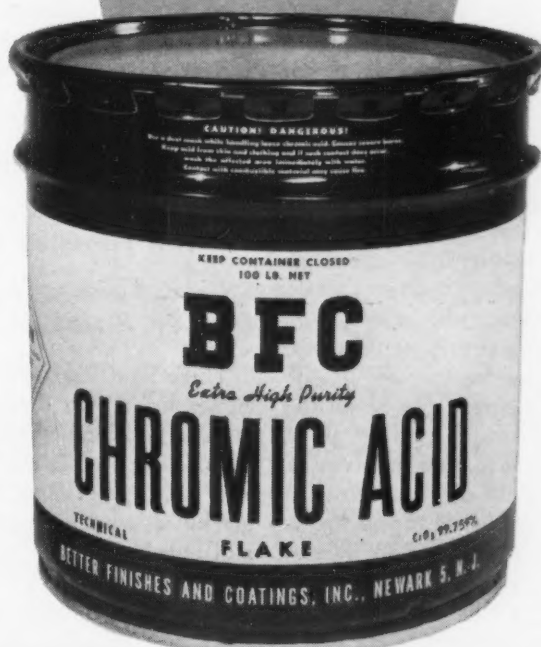
the parts they formerly contained. Then the clean, dry batch of work is loaded, automatically, into the same, clean and dry tote pan.



METAL FINISHING, April, 1957

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Los Angeles 21, California

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This particular machine was designed and built for a wash, rinse and dry sequence but the machine can incorporate any combination of cleaning, pickling, phosphate coating, and similar operations. Processes unnecessary for the tote pans or other containers would be eliminated in the conveyor section.

A single pump and motor recirculates solution to both drum and conveyor sections at each stage, effecting additional savings. Tanks are heated by gas immersion tube pressure type gas burners and drying air is heated by a direct fired type burner. Tanks and drying air can be heated by steam, oil or electricity as required. The ma-

chine is approximately 28' long, 7-1/2' wide and 11' high.

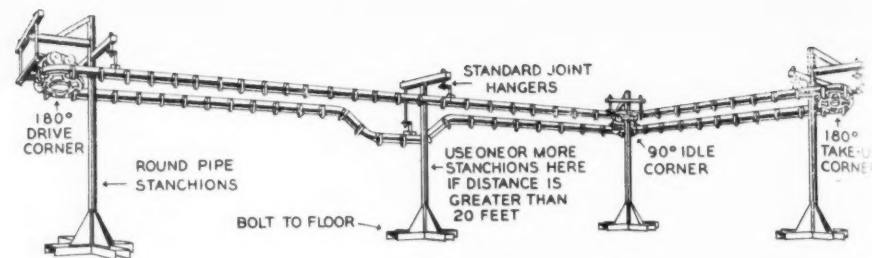
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Cable Conveyor

The Tipp Mfg. Co., Dept. MF, Tipp City, O.

Standardized floor-mounted supports are specifically designed to simplify and reduce the cost of installing overhead cable conveyors. Pre-assembled in the factory and shipped knocked down, but they may still be "tailored" easily to fit particular requirements and conditions.

Biggest advantage of the new floor-mounted supports is that they eliminate the problems involved in installing cable conveyors when roofs are weak, too high, or cluttered with supports for other equipment and utilities. The new supports may be lag bolted to the floor or may be simply placed on the floor and then sway-braced to plant walls. In most cases, installation is so simple that a plant's own maintenance force can erect cable conveyors incorporating the new supports in a rela-



tively short time. Thus, there is no need for the engineering, scheduling of erection, and lengthy down-time formerly required in connection with conveyor installations.

Pre-engineering hollow pipe stanchions are used with standard brackets

and adapters to make up the supports and all the parts are completely interchangeable with existing Tipp equipment. Bolts are used exclusively to assemble the cable conveyor systems, to insure easy assembly and alteration.

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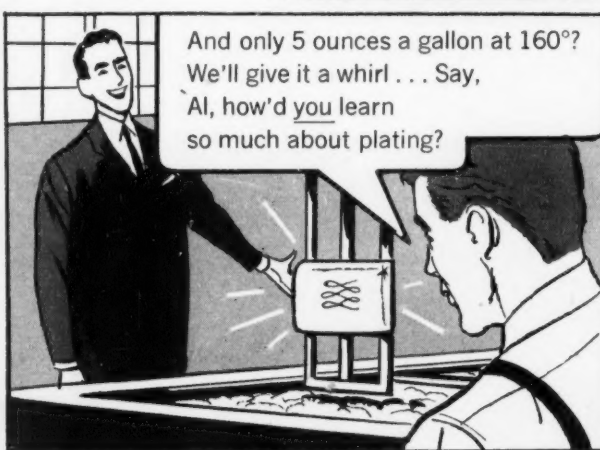
Belt Polishing Machines

Hi-Lite Polishing Machine Co., Inc., Dept. MF, Route 2, Sheboygan, Wis.

Three new coated abrasive belt machines have been designed for grinding and polishing large diameter tanks, such as are used in the dairy, chemical and food processing industries. The machines are: a seam weld grinder and polisher, an ID tank grinder and

polisher, and a tank head grinder and polisher.

The seam weld grinder and polisher is designed to handle seam welds on flat sheets or open end tanks with a minimum of 30" in diameter, up to 10' long, with machines available to accommodate longer length tanks. Coated abrasive belt speed is 6,500 s.f.p.m., and the grinding head has a traverse speed of 20 f.p.m. An auto-

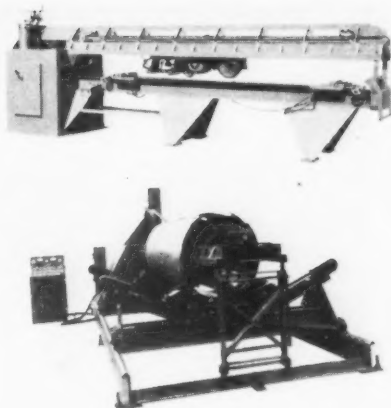


"To work for Pennsalt, I had to learn not only your problems but the problems of the drawing shop, the paint shop, the porcelain enamel boys, the aluminum fabricators — everybody who uses chemicals on metal."

matic cutting oil applicator operates only when the belt is in contact with the work. Depending on the weld, belt widths run from 1/2" to 2 1/2", and close accuracy is possible so as not to undercut the weld or disturb the finish on either side of it.

A gantry type seam weld grinder is also available for grinding welds where multiple steel sheets have been joined. The sheets are held in place by air clamps as the abrasive belt grinding head moves over them.

For polishing the inside diameters of open end cylindrical tanks, the ID tank grinder and polisher produces a uniform longitudinal scratch pattern. The machine is designed for tanks ranging from 33" to 20' in diameter, and up to 12' long, and utilizes a 6" x 148" coated abrasive belt. The abrasive belt is mounted on a traversing grinding head which lifts from the work at the end of each pass, allowing the tank to be rotated. The amount of overlap of each successive belt pass can be closely controlled, and the rate of carriage travel is variable. All controls are centralized on a master panel.



The machine is approximately 8' wide by 22' long, and has a belt speed of 6,500 s.f.p.m. with a traverse speed of up to 20 f.p.m. The abrasive belt is lubricated with an automatic oil spray device to lengthen belt life and produce a uniform finish.

A companion machine to the seam and ID grinders is the tank head grinder and polisher, which operates on the basic principle of a swing grinder. The unit is designed so that the operator has full vision of the point of contact. The machine utilizes

a 1", 1 1/2" or 2" coated abrasive belt running over a serrated rubber contact wheel, with a belt speed of 6,500 s.f.p.m.

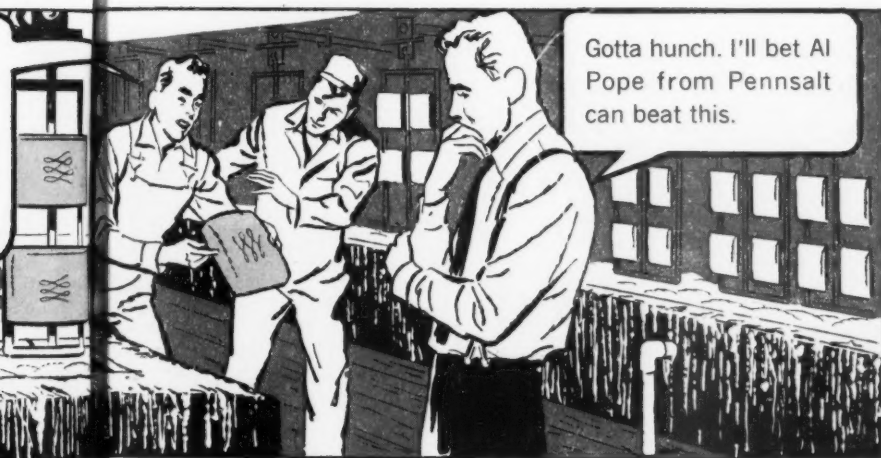
The head grinder can be used on either the inside or outside of pressed or spun stainless steel heads, which are held by either mechanical or vacuum clamping methods. The standard model head grinder will accommodate tank heads up to 6' in diameter.

107/Circle on Readers' Service Card

New, Fast Method of Buffing Printed Circuit Surfaces

Maplewood Companies, Dept. MF,
P. O. Box 113, Livingston, N. J.

The above firm claims to have perfected a buffing method which leaves printed circuit sheets dry, clean and uniform, in which the sheets are run continuously, doing either one side only, or both sides simultaneously, at the direction of the operator, at a production rate exceeding 60 square feet per minute. Moreover, no tooling is required, whether the sheet size is



Gotta hunch. I'll bet Al Pope from Pennsalt can beat this.



I think we can get these shells perfectly clean... and save you money besides, by letting you run your tanks cooler. I'll check our Whitmarsh lab.

OK, but hurry, Al.



Two Weeks Later...

Al, your service is as good as your products. We weren't getting anywhere with that buffing gook till I let Pennsalt work on it.

Remember—nobody knows more about metal processing chemistry than Pennsalt. Even if your trouble may not seem to involve your Pennsalt salesman, call him in anyway. Or write

Metal Processing Dept. 427
Pennsalt Chemicals
3 Penn Center
Phila. 2, Pa.

Please send me information on Pennsalt
☐ metal cleaners ☐ phosphate coatings
☐ cold-working lubricants.

Name _____
Company _____
Street _____
City _____ Zone _____ State _____

**Pennsalt
Chemicals**

12' x 12' or 36' x 36'. The firm will gladly process samples for prospects, upon request.

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BUSINESS ITEMS

Coxe New Manager of Handy & Harman Metallurgical Dept.



Charles D. Coxe

Handy & Harman, manufacturers and refiners of precious metals and alloys, has announced the appointment of *Charles D. Coxe* as manager, metallurgical department.

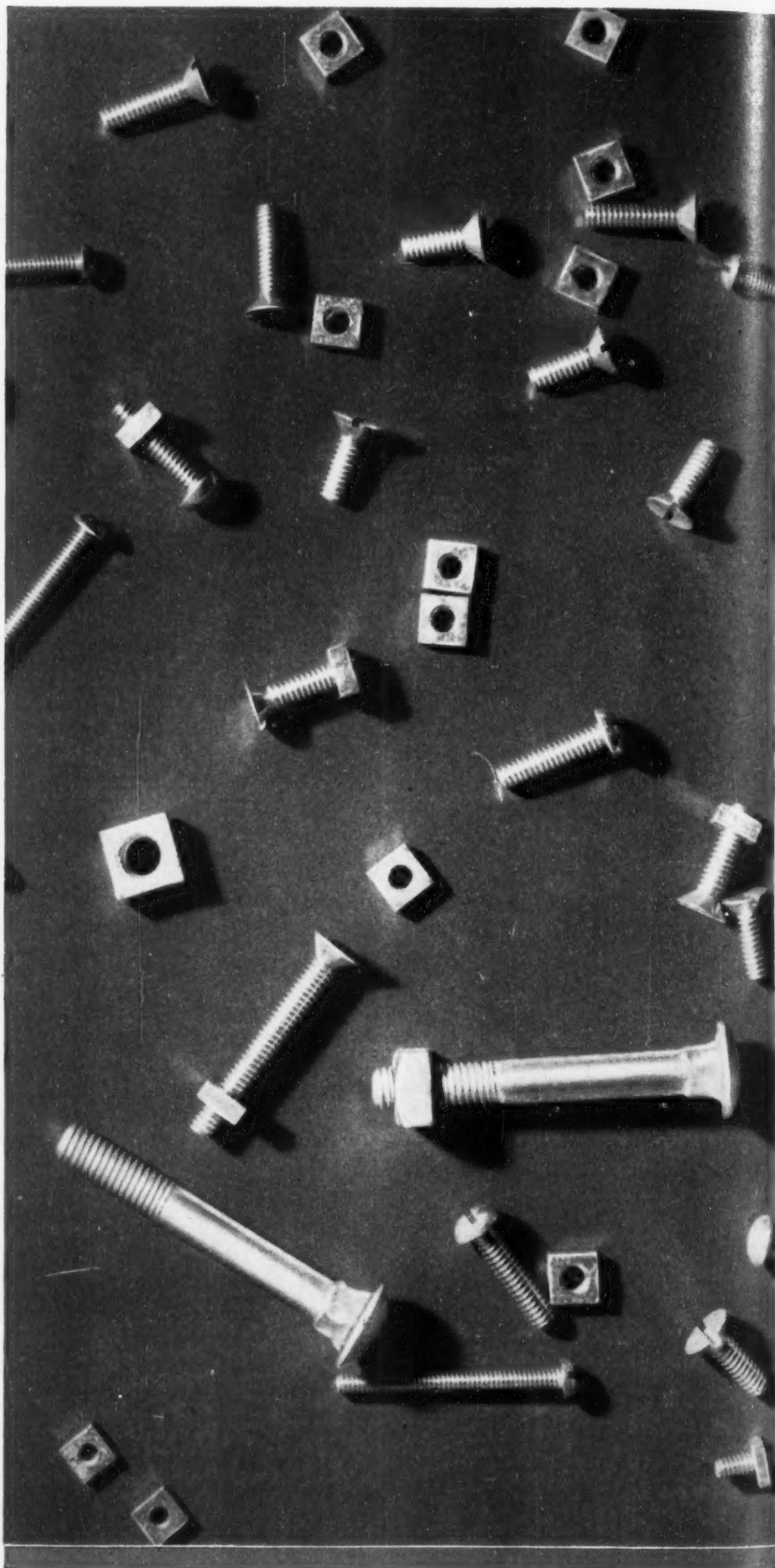
His responsibilities will include operation of the company's technical and assay laboratories, technical control in plants and powdered metal products manufacturing.

Mr. Coxe became affiliated with the company in 1946 as chief metallurgist, technical laboratory. Subsequently he was made assistant manager, metallurgical department. Earlier, he had spent 10 years in research and development work with *duPont* and *Remington Arms Co.*, and three years with the steel industry.

He holds a degree in Metallurgical Engineering from *Lehigh University*.

Charles F. Radley Retires from Active Duty with Oakite Products

Charles F. Radley, one of the original directors of *Oakite Products, Inc.*, has retired from active duty as director of publicity and member of the company's board of directors. He is, however, continuing in the employ of the



FEDERATED products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust

Brighter Plating at lower cost!

Competitive testing at ASARCO's Central Research Laboratory has proved that Federated Plating Brighteners will do a better job at lower cost.

CADMAX for cyanide cadmium plating, is compatible with all organic brighteners, comes with an adjuster solution to give you brilliant results, even from a new bath. No break-in is required.

ZIMAX in powder or liquid form, is most economical to use. It is applicable to every type of zinc plating operation, and is compatible with most other zinc brighteners.

NIMAX is a highly concentrated nickel brightener for use in barrel nickel plating. Five cents worth is enough for approximately 50 pounds of work. The deposit is ductile and extremely corrosion-resistant.

Send us a sample of your plating bath. Then follow the simple instructions that we give you. You'll get better results, at lower cost!



Federated Metals



Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.
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company as a consultant on advertising, public relations, and general management policy.

Employed in 1917 as editor of *Oakite News Service*, the firm's external publication, Mr. Radley was elected to the board of directors in 1926, when that company was organized as successor to the original Oakley Chemical Co. He was appointed director of publicity in 1927. For the past thirty years he has been responsible for the firm's entire industrial advertising program,



Charles F. Radley

including trade publications, exhibits, direct mail, literature, and printing.

Magnuson Products Establishes Scholarship

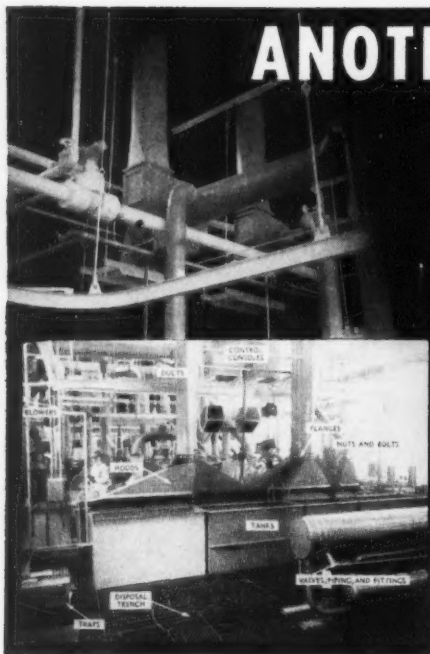
Establishment of a scholarship at Lehigh University, Bethlehem, Pa., as a memorial to *Edward Magnuson*, founder of *Magnuson Products Corp.*, has been announced by *Ingrid Magnuson*, president of the company.

The scholarship, which will be activated in the spring semester of 1957, will be awarded annually by the University to an undergraduate on the basis of need, scholarship and character.

Allied Research Appoints Horelick

Allied Research Products, Inc., Baltimore, Md. manufacturers of the chromate conversion coatings and plating chemicals, announces the appointment of *Jules Horelick* as staff executive assistant to *H. C. Irvin*, president.

In his new capacity, Mr. Horelick will play a major role in the firm's new and extensive program of product expansion and development and will be directly responsible for market research



ANOTHER P.V.C.* SUCCESS STORY BY ipf

Scintilla Division
of Bendix Aviation Reports
Maintenance-Free P.V.C. Service

*Rigid Polyvinyl Chloride (P.V.C.) Fabrication by Industrial Plastic Fabricators — the new material of construction — is being used for 90% of the equipment at Scintilla Division's new Plating Rooms.

These facilities, generally recognized as the most modern in the country, have used IPF Products without a single replacement.

Plating tanks . . . stands . . . exhaust systems . . . baskets and trays . . . and drainage troughs were a frequent source of interrupted production when corroded metal equipment needed replacement. Even costly rubber lining of the metal to protect against the acids and corroding fumes did not solve the problem. But — since Scintilla Division's conversion to P.V.C. — no replacements, no slowdowns, no lost time.

IPF blowers, hoods, tanks, ducts, piping systems, valves, nuts and bolts, and machine parts can also solve your corrosion problems. P.V.C. is a lightweight, smooth surfaced, nonporous, plastic material. Its inherent anti-corrosive qualities insure long life — reduced maintenance costs.

For further information write for bulletin 103.

MANUFACTURED BY
Industrial Plastic Fabricators, inc.
NORWOOD, MASS. NORWOOD 7-3411

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Jules Horelick

with relation to new and existing products.

Mr. Horelick has been with the company since its inception in 1947, his most recent capacity having been as manager of a subsidiary operation, Allied Metal Finishing Corp. Prior to joining Allied Research he had gained a wide experience in metal finishing through associations with other companies in the field. He is a graduate of the University of Illinois and is also the current president of the Baltimore-Washington Chapter of the A.E.S.

H-VW-M Names Nairne Manager of Buff Sales

Hanson-Van Winkle-Munning Co. has announced the appointment of



William A. Nairne

William A. Nairne as manager of buff sales. His headquarters will be located in Grand Rapids, Mich., at the company's midwest plant. There he will be closely associated with the firm's buffing program and staff of finishing engineers in the continuing development of a complete line of buffs for the metal-finishing and allied industries.

For the past three years Mr. Nairne has served as sales representative in the company's San Francisco area. Before joining H-VW-M in 1954, he was associated with the A. J. Lynch & Co. of Los Angeles, serving as manager of that company's plating division.

During World War II he served as an officer with the U. S. Army, and was awarded the Silver Star, Bronze Star and Purple Heart with cluster. He is a graduate of the University of Arizona, and a member of the American Electroplaters' Society.

Betts Appointed by Armour & Co.

The Coated Abrasives Division, Armour and Company, Alliance, Ohio, announces the appointment of Frank H. Betts as a new sales supervisor for the Detroit area, specializing in automotive manufacturer sales.

Prior to joining the firm, Mr. Betts was associated with Sterling Grinding Wheel Co. He is a graduate of Wayne University.

Cherry Elected President George L. Nankervis Co.

The board of directors of the George L. Nankervis Co. has announced the election of Harold M. Cherry as president, following the recent death of George L. Nankervis, founder and former president of the company. Mr.



Harold M. Cherry

Cherry has been associated with the corporation since 1944 and was senior vice-president. He is a graduate engineer from the University of Michigan and a resident of Huntington Woods. He is a member of the American Ordnance Association, The Engineering Society of Detroit, and the American Electroplaters' Society.

The board of directors also appointed *Claude E. Cox*, *Henry W. Grikscheit*, *Vernon G. Converse* and *Stanley R. Andersen* to the executive committee.

Diamond Alkali to Construct New Plant

Diamond Alkali Co., Cleveland, Ohio, a leading producer of both organic and inorganic chemicals for industry and agriculture, has announced plans for constructing a new plant to produce 50-million pounds of vinyl chloride monomer annually. The new facility will be located at Diamond's Deer Park Plant at Houston, Texas.

This new vinyl chloride monomer plant will be designed and engineered by Scientific Design Co., Inc., New York. Brown & Root, Inc., of Houston, construction engineers, will build the plant, which is scheduled for completion early next year.

Kelite Corp. Names Sakavich

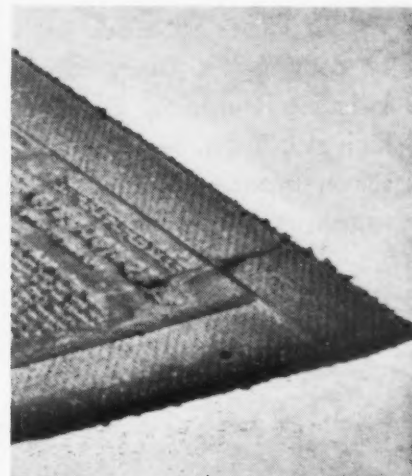
A. E. Sakavich has been named in charge of sales development service for *Kelite Corp.*, manufacturers of industrial chemicals and steam cleaning equipment. He will be part of the marketing department in Berkeley Heights, N. J., where his duties will include advertising and sales promotion.

Mr. Sakavich was formerly associated with The Monaghan Co. Inc., Newark, N. J., as an account executive.

Better work, less waste with "Plus-4" Anodes



TYPICAL TREEING that occurs when using ordinary electrolytic tough pitch copper anodes.



MINIMUM TREEING illustrates one of many savings with "Plus-4" (Phosphorized Copper) Anodes.

The Cincinnati Electrotape Co., of Cincinnati, Ohio, switched to Anaconda "Plus-4" Anodes and now tells its customers on its advertising blotters:

"We use PHOSPHORIZED COPPER because it has . . .

1. Finer, smoother *Grain Structure*. Retains the true value of modern type faces, dot formations of halftone, and tone value of multicolor engravings.
2. Over-all *Uniformity* of shell thickness, longer plate life, reduces replacement costs.
3. Greater *Tensile Strength*, maximum resistance to abrasive and chemical action of colored inks.
4. Sturdy *Backup* for Nickeltypes.

5. Better Adhesion for chrome."

From an operating standpoint, Cincinnati Electrotape is also enthusiastic. "Plus-4" Anodes cut waste from treeing (shown above), from solution correction and from sludge. With electrolytic tough pitch copper anodes, they used to clean sludge from tanks 3 times a year. Tanks filled exclusively with "Plus-4" Anodes will run a year or more without cleaning. They also report a time saving of 30% or more in a normal plating cycle when using "Plus-4" Anodes.

It will pay you to see for yourself how Anaconda "Plus-4" (Phosphorized Copper) Anodes can save you time and money—give you better work. Send the coupon today.

67141

"PLUS-4" ANODES (Phosphorized Copper)

A product of

ANACONDA

Made by The American Brass Company

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The American Brass Co., Waterbury 20, Conn.
In Canada: Anaconda American Brass Ltd.,
New Toronto, Ont.

Give me details on how I can get a test quantity of
"Plus-4" Anodes sufficient to supply one tank.

NAME.....
COMPANY.....
ADDRESS.....
CITY.....ZONE.....STATE.....

Stanley Chemical Names Kubinak a Sales Representative

Robert T. Kubinak has been named a sales representative for *The Stanley Chemical Co.*, a subsidiary of *The Stanley Works* located in East Berlin, Conn. He will represent the company in its central Pennsylvania territory.

A native of Perth Amboy, N. J., Mr. Kubinak attended schools there and graduated from Seton Hall University with a B.S. degree in chemistry. He was formerly a technical representative for the United Chromium Div. of Metal and Thermit Corp. During his army service, he was in charge of the protective coating research laboratory

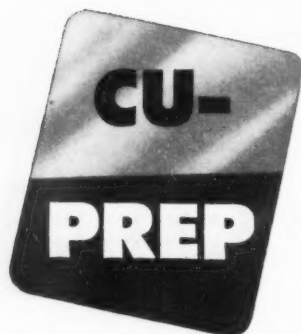


Robert T. Kubinak

BLACKENING COPPER?

To get the finest black finish on copper and all its alloys, including Duronze, Everdur, high zinc brass, beryllium and silicon bronzes, take advantage of the features of:

Du-Lite



- No acid pickle or bright dip.
- No dimensional changes or surface damage.
- No acid drag-in. Assures stabilized blackening bath throughout longer life — more economical.

Write for full details. Du-Lite Cu-Prep is made and guaranteed exclusively by the metal finishing specialists:

Du-Lite
METAL FINISHING SPECIALISTS

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONN.

Send more information on Du-Lite Cu-Prep . . . ☐

Send information on metal finishing products . . ☐

Have your representative call ☐

Name.....

Company.....

Address.....

City..... Zone..... State.....

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at the U. S. Army Chemical Center, Edgewood, Md.

Cowles Licenses Processes to Australian Chemical Firm

Cowles Chemical Co., Cleveland, has granted licenses to *Nightingale Supply Co., Ltd.* and its subsidiary *Nightingale Silicates Pty., Ltd.* of Sydney, N.S.W. Australia, covering its furnace and processes for the manufacture of Drymet, anhydrous sodium metasilicate and other detergent silicates.

The license also includes processes, formulas and the use of Cowles' trade names covering their complete lines of metal finishing chemicals. Nightingale has been in the silicate and industrial cleaning chemicals business for some time, and are, therefore, in an excellent position to manufacture and distribute these products in the rapidly expanding industrial markets in Australia and New Zealand.

Construction of Nightingale's new plant in Sydney has been completed and production is expected to begin in early February.

Stevens Introduces New Service

Frederic B. Stevens, Inc., Detroit metal finishing equipment and supply firm, is offering a new merchandising service to their production jobbing customers. Plating and anodizing firms using the company's plating and processing equipment will be furnished, without cost, two-color promotion folders for mailing to their customers.

The folders can be used as envelope inserts for mailing with quotations, invoices and sales correspondence. They also are designed to be used as self-mailers to the job shop's customer mailing list.

The new merchandising piece features a photograph of the plating company's Stevens installation, the company's address and phone number. Printed matter stresses the advantages, for the job shop customer, obtained from dealing with a firm offering the more uniform plating thicknesses, increased production and more rapid service available.

Company executives feel that the new folders will enable the small and medium sized production plating and anodizing plants to compete with the larger companies in the field of direct mail advertising and merchandising. Plating firms interested in the merchandising folders can obtain further information regarding the program by writing to the company.

HIGHER LUSTRE IN BARREL TUMBLING FOR ZINC DIE CASTING

You can save as much as 90% in time in barrel processing zinc and aluminum die castings with specially developed **PERMAG** compounds.

FOR BARREL COLORING— **PERMAG #338**

It will save you time and money. It takes only 45 minutes with but 1/3 of an ounce per gallon of **PERMAG #338**, to do a superior job on a barrel-load of zinc and aluminum die castings. For far better jobs, investigate the many advantages of **PERMAG #338**.

FOR BARREL DEBURRING— **PERMAG #370**

Satisfactory results in your deburring operations are possible with **PERMAG #370**, specifically developed for barrel deburring of all metallic parts. **PERMAG #370** is efficient, economical and also useful as a rinsing agent.

Write today for samples and complete data on these and other **PERMAG** compounds, or for the assistance of **PERMAG** technicians on any tumbling or cleaning problems you may have.



MAGNUSON

PRODUCTS CORPORATION

50 COURT ST. BROOKLYN 1, N. Y.

In Canada: Canadian PERMAG Products, Ltd., Montreal

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Maplewood Companies Expands Facilities

Due to the increased demands from the metal finishing industry, *Maplewood Companies*, has expanded its engineering facilities, and has moved to larger quarters, in Livingston, N. J. Headed by D. J. "Don" Wahler, well-known mechanical metal-finishing consultant, the firm acts as direct factory representatives in the Eastern, Middle Atlantic, and Southeastern sections of the U. S., for the Packer Machine Co.

Advancement for Findlan

J. C. Findlan has been advanced to the position of sales manager of the *Geigy Industrial Chemical Div.* of *Geigy Chemical Corp.*, Mr. Findlan has been field representative since 1953, at which time the division was identified as *Alrose Chemical Co.*

With headquarters in Cincinnati he represented the division in the East Central and Southern states. A graduate of the Institute of Technology, University of Minnesota, Mr. Findlan was formerly associated with Armour Laboratories, Chicago, where he served in that company's research and product development departments, and with the Westvaco Chemical Division, F. M. C., whom he represented as district sales manager. He saw service during World War II as engineering officer in mine warfare, and aerological officer in the Navy's Weather Fleet.

Diamond Alkali Promotes Davis

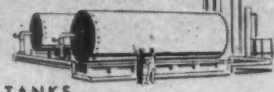
Promotion of *Jack E. Davis* to the post of special staff assistant in the Sales Department has been announced by *Diamond Alkali Co.* He comes to his new position following nearly 11 years' experience as a member of the company's Philadelphia branch sales staff. He joined the organization in September, 1939 as a sales clerk in Pittsburgh and was transferred to Painesville the following year.

A native of Pennsylvania, born in Swissvale, he was graduated in 1938 from the University of Pittsburgh with a B.S. degree in business administration.

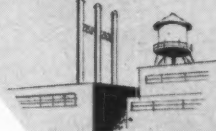
Davis is a World War II veteran, having served in the U. S. Army, 171st Combat Engineers Battalion, from August, 1943 to April, 1946, when he returned to Diamond. Since then, as a member of the Philadelphia sales staff, he has represented the company in the Eastern Pennsylvania area.



STRUCTURAL STEEL



TANKS



STACKS



WALLS AND FLOORS



TANK TRUCK EXTERIORS

CEILCOTE E-900

THE ONE-COAT HEAVY DUTY PROTECTIVE COATING

ONE COAT = 10 MILS

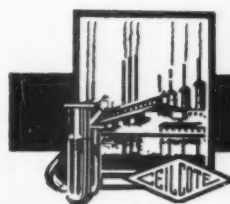


Providing outstanding resistance to a wide variety of chemicals, acids, alkalis and solvents, SERIES E-900 COATINGS offer the same protection afforded by up to ten coats of conventional paints. In addition, SERIES E-900 COATINGS assure long lasting protection to severe weathering.

These new coatings can be applied by brush or roller coat after the addition of a hardening agent. Regularly available in clear . . . white . . . gray . . . or sea-foam green. At normal temperatures, SERIES E-900 COATINGS are dry to touch in about six hours.

RECOMMENDED APPLICATIONS INCLUDE: structural steel . . . tank exteriors . . . lining for industrial water tanks . . . tank truck exteriors . . . stacks . . . exhaust fans . . . concrete piers for plating foundations . . . floors under storage tanks . . . building walls . . . pit walls.

SERIES E-900 COATINGS are high solids modified epoxy formulations which result in superior toughness, resistance to abrasion and superb adhesion to practically any type of clean surface. Because of high solid content, 95% of the applied thickness is converted to a protective film.



Write today for
TECHNICAL BULLETIN E-900

THE CEILCOTE COMPANY INC.

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* Birmingham, Alabama • Buffalo, New York • Chicago, Illinois • Cleveland, Ohio
* Detroit, Michigan • Evansville, Indiana • Houston, Texas • Kansas City, Missouri
* Los Angeles, California • San Francisco, California • Seattle, Washington • Springfield, Mass.

* Warehousing

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Du Pont to Build New Plant

A new, modern sulfuric acid plant will be built by the *Du Pont Company*, on the Detroit River at Ecorse, Mich., about eight miles south of Detroit. The new unit, to be built on the company's present plant site, will replace an existing plant which has become obsolete.

The new unit will substantially expand production over the present facilities and will enable the company to meet increases in customer demand for sulfuric acid. Operation of the new facility is not expected to require any increase in employment.

Present production of sulfuric acid will not be interrupted, since the old plant will not be dismantled until the new plant is in operation. Construction will begin next month and the new unit is expected to be in operation early in 1958.

This plant, known as the Ecorse works, serves principally industries in the greater Detroit industrial area. The new plant is the sixth new unit in Du Pont's post-World War II modernization program of sulfuric acid manufacturing facilities.

New Chemical Corp. Organized

Sole Chemical Corp. was recently organized as a highly specialized chemical marketing organization by *Solomon Epstein*, former executive vice president and general manager of *Emulsol Chemical Corp.* The new firm will base its organic specialty sales program on a customized technical service program to the chemical processors, formulators, and manufacturers in the fields of detergents, emulsifiers, anti-foamers, and other surface active agents. The administrative headquarters and central development laboratories will be located at 27 East Monroe St., Chicago, Ill.

Herman Zagerinsky has been appointed manager of production. He was formerly in production control at *Emulsol Chemical Corp.* and at *Gross Egg Co.*

New Mail Service by Carborundum

A new concept in abrasive technology called "Maximum Automation Potential," an abrasive and abrasive

belt machine engineering service, developed by *The Carborundum Co.*, gives manufacturers recommendations by mail for improved metal removal methods with predictions of savings over old methods.

The manufacturer writes to the company, Niagara Falls, N. Y., Attention: M.A.P. Dept. By return mail the M.A.P. brochure is sent to him. He details his problem in the form enclosed in the brochure and mails it back. Specially trained engineers study the manufacturer's problem, formulate an item by item recommendation, compare costs of the recommended new method with the method currently used and project increased production and savings. The free recommendation is promptly mailed back to the manufacturer for his consideration.

Personnel Changes at Parker Rust Proof Co.

Parker Rust Proof Co. has announced the appointment of *R. L. Greene*, assistant sales manager, to Special Products Sales to supervise all activities in connection with aluminum

McKeon's Zinc-Brite

Top-quality, low-cost

ZINC SOLUTION PURIFIER

Eliminates heavy metal impurities, including copper.
Prevents harmful build-up of carbonates.

A complete cleansing treatment: — No other purification measures necessary.

WRITE - PHONE - WIRE COLLECT

Sulphur Products Co. Inc.
621 West Pittsburgh Street
Greensburg, Pa.

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- ★ **BUFFING NU SPRA GLU**
Liquid buffing compound
since 1945
- ★ **NUGLU**
Cold flexible glue
since 1937
- ★ **BRUSHING NUGLU**
Grain and Nuglu mixture
since 1941
- ★ **SPRAY BUFFING
EQUIPMENT**
Guns, pumps, and valves
since 1945

J. J. *Siefen* CO.

5643 LAUDERDALE • DETROIT 9, MICH.

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treatments marketed by the firm. He will work closely with field men in calling on accounts in this rapidly expanding field. Mr. Greene has been with the company for 17 years and has had over twenty-four years of experience in selling and servicing metal treatment coatings and installations.

Also announced were the appointments of *R. L. Peterson*, general service manager, to the post of Central Region manager and *C. F. Rasmussen*, assistant service manager, to the post of assistant Central Region manager. Mr. Peterson has been with the firm for 15 years and has served in the research and sales-service departments prior to his appointment as general service manager. Mr. Rasmussen has been with the company over 10 years.

Gillespie and Walmsley Advance at Hooker Electrochemical

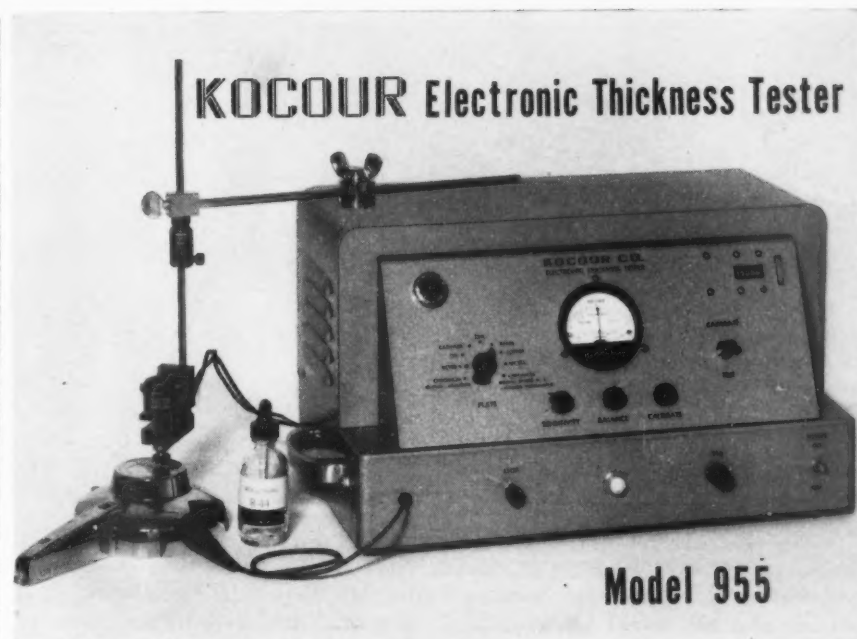
William L. Gillespie and *John T. Walmsley* have advanced to new posts in the sales department of *Hooker Electrochemical Co.*

Mr. Gillespie formerly manager, Chicago district sales, now assumes the new title of manager, sales administration, and will move shortly from LaGrange, Ill., to Niagara Falls. He will be responsible for the sales coordination group and other office staff, orders, records, and all internal sales office functions.

Mr. Walmsley, formerly sales representative for the Michigan and northern Indiana territory, will replace Mr. Gillespie as manager, Chicago district sales, operating from the company's sales office at 1 North LaSalle Street, Chicago, Ill., which serves the Midwest, south to the Gulf of Mexico.

Born in Springfield, Mass., Mr. Gillespie received the B. A. degree from Alfred University in 1939 and came directly to Hooker, first as a chemical process operator and then as operating foreman in the research and development department. Transferring to the sales department in 1950, Mr. Gillespie served with the technical service group, then as a sales representative and, in 1953, was named manager, Chicago district sales.

Mr. Walmsley is a native of Alabama and received the B.S. and M.S. degrees in chemical engineering from Virginia Polytechnic Institute in 1948 and 1950 respectively, where he became a member of the honorary so-



A NEW MODEL . . . to solve your plating thickness problems!

Here's the New Model 955 . . . the answer to your plating thickness problems . . . a single instrument with a wider application than most other methods. And in addition, human error is virtually eliminated . . . operation is simple and automatic . . . readings are direct . . . accuracy 90-95% . . . results are reproducible . . . average test requires about one minute.

NEW Calibration feature ensures "long term" accuracy!

The accuracy of a thickness test can be no better than the accuracy of the method used. The Kocour Electronics Thickness Tester Model 955 gives you direct readings with an accuracy of 90-95%. Furthermore, with the new Calibration feature used in conjunction with Kocour Thickness Standards, you can not only check the accuracy, but calibrate the instrument to automatically correct slightly high or low readings. In addition any malfunctions due to a defective component will be indicated. Don't risk the quality of your product any longer . . . get the details on the New Model 955 today!

Ask for a demonstration or 15-day Free Trial!

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Joining the company at Niagara Falls in the process study group in 1950, Mr. Walmsley was appointed an assistant sales engineer at the Tacoma, Wash., plant in 1950, returning to Niagara in 1952 for a year as a sales coordinator until being made Michigan sales representative.

Rouse Joins Better Finishes

Leslie Rouse has been assigned by *Better Finishes & Coatings*, 268 Doramus Ave., Newark 5, N. J. as sales representative for the New York State area for that company's line of industrial finishes, architectural and maintenance paints and strippable coatings

according to a recent announcement. Prior to enrolling in the firm's laboratory training program for its future sales personnel, Mr. Rouse represented the Cory Corp. in the Rochester, N. Y. area.

Wyandotte Chemicals Technical Service Department Expands Activities

Wyandotte Chemicals, J. B. Ford Division, Technical Service Department has recently expanded its activities. Additional laboratory space has been assigned to the department both in Wyandotte, Mich. and Los Nietos, Cal. Additional personnel has been added to give both expanded field and laboratory service.

The experience of this group, plus



files that cover over 40 years of every application of commercial washing, cleaning and germicidal operations, is available everywhere to North American industry.

Shown left to right — Back Row: Charles A. Wyatt, Leo J. Hawk, Thomas A. Gilman, Howard L. Anderson, Victor P. Boka, Richard H. Andrew, Armin A. Roth, Eugene G. Nutting, William F. Hawk, and Gail A. Smith.

Front Row: Lee H. Minor, Rosalie Giaimo, Vera C. Heins, Donald E. Anderson, Beatrice M. Rike, Beverly J. Campeau, Robert J. Mooney, and Fred A. Vassar.

Diamond Alkali Promotes Walsh

Appointment of Mervyn T. Walsh to manage muriatic acid sales for the Chlorinated Products Division of Diamond Alkali Co., Cleveland, Ohio, was

announced recently. A Detroit native by birth, Walsh joined the Cincinnati sales office in 1948 as a branch sales promotion and technical service representative. Promoted to manage Chlorowax sales in March, 1954, he was appointed sales promotion representative in April, 1956.

Walsh holds B. S. and M. S. degrees in chemical engineering from the University of Michigan, Ann Arbor. He is a member of the American Chemical Society and the American Institute of Chemical Engineers.

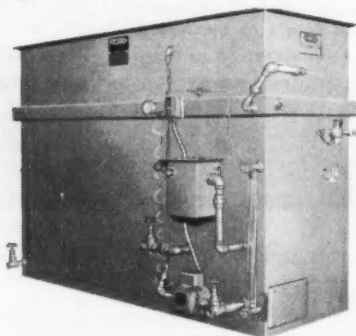
Minnesota Mining Promotes L. M. Thul

Promotion of L. M. Thul to automotive manufacturing trades sales manager, coated abrasives division, has been announced by Minnesota Mining & Mfg. Co. Two other personnel changes within the division were also announced.

Donald J. Scholten was promoted to central region sales supervisor, and Ellsworth W. Erickson was promoted to assistant superintendent of factory quality control.

Circo Vapor Degreasers use 30% less solvent

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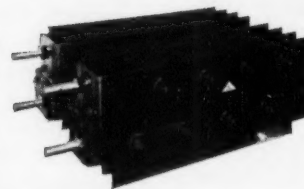
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MORE FOR YOUR MONEY**

- ★ Operate from —40° to 225° F.
 - ★ 50 to 50,000 Amperes DC
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- Two styles available—1. Selenium for cool zones, or 2. Magnesium copper sulphide for the hot, dirty jobs. Units still running after 4 years of constant duty.



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Magnesium copper sulphide rectifiers make your plating power supply more rugged and dependable. Magnesium radiator fins for fast heat dissipation and lighter weight. Matching pairs.



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SOME JOBBERS AND SALES TERRITORIES OPEN

ELECTRONIC RECTIFIERS, INC.

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Thul, who has been with the firm since 1944, replaces *W. J. Heil*, who retired from the company recently after 36 years of service. Scholten, who joined 3M in 1949, will report directly to *H. C. Kenyon*, central region sales manager for the division. Erickson has been with the firm since 1943, and was formerly general quality supervisor at the company's Cumberland, Wis., abrasives converting plant.

Pennsalt Holds Sales Meeting

Pennsalt Chemicals, Metal Processing Products recently held a sales meeting at Seaview Country Club in Absecon, N. J. Fifty members of the company's field sales staff from all areas of the U. S. and Canada assembled for the three-day conclave got a complete review of modern service methods as they apply to the firm's metal processing products.

Sales Manager *John M. Davidson*, assisted by chemical specialties director of sales *J. Stanley Hall* and Product Manager *Horace F. McIntyre*, directed a series of panel discussions and sales



clinics revolving around the company's nationally known line of metal cleaners, phosphate coatings, and cold working lubricants for the metal fabricating and finishing industries. Speakers included *William M. Lee*, manager of sales service at the company's White-marsh research and development laboratories, and *Jack C. Lum*, manager of new products.

President *William P. Drake* addressed the men on the company's current expansion program. *Albert H. Clem*, general manager of the Chemical Specialties Division, discussed the future expansion plans of the division.

Walworth Co. Names V.-P.

Frederick M. Jackson has been named vice-president in charge of

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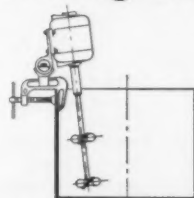
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Will Speed-up
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Sturdy, dependable Mixers for any size or shape, new or existing Tanks; for single or multiple installations. Alsop Portable Mixers are easily and quickly mounted. Sizes 1/4 to 7-1/2 H.P.

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sales for the *Walworth Co.*, leading manufacturer of valves and fittings.

A native of Malden, Mass., Mr. Jackson graduated from Cambridge Latin School and Bryant & Stratton Business School. He joined the firm in 1926, becoming Eastern divisional sales manager in 1940, and vice-president for oil and gas industry sales in 1952.

Branson Instruments Expands into Larger Quarters

Branson Instruments, Inc., and its subsidiary, *Branson Ultrasonic Corp.*, recently moved into a brand new plant at 37 Brown House Road, Stamford, Conn. This gives the company some 24,000 sq. ft. of working floor space, more than twice that available in the old plants at 430 Fairfield St., and Richmond Hill Ave.

This latest move is another in a series of expansions. Starting in two rooms of an old frame house, a little over ten years ago, the company has been rapidly and continually growing



ever since. Whereas it was a two-man organization when it started, the firm employs more than sixty today. Sales, too have kept pace, increasing by almost fifty per cent for each year of operation.

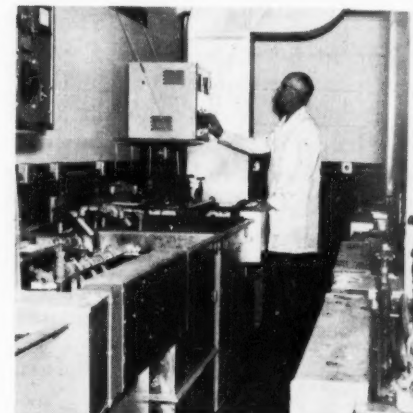
Pilot Facilities for Aluminum Finishing

Pilot facilities for a broad range of aluminum finishing operations are now in operation at *Kaiser Aluminum & Chemical Corp.*'s Department of Metallurgical Research, Spokane, Wash.

The new facilities are designed to accomplish three purposes:

1. Processes developed by the department are evaluated on a scale sufficiently large to predict production performance. Important full scale production factors such as the design of equipment, production handling techniques, process control, reproducibility and life of a process are evaluated on a semi-production scale.

2. Samples of finished aluminum are produced in quantity. Such samples are



Laboratory technician adjusts controls of electroplating and electrolytic processing line.

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Metropolitan Distributors

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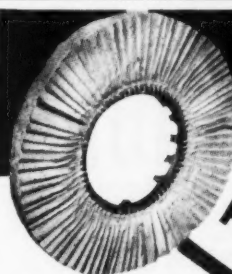
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FLEXIBILITY for FASTER
CUTTING and HIGHER
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for more keys to
**GREATER BUFFING
OUTPUT**
See pages 15, 114, 118, 122

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used by other departments of the corporation for further testing, for field use or for sales purposes.

3. Experience acquired in evaluating various processes and operating the facilities will be directly reflected in increased technical assistance to aluminum fabrications.

The pilot equipment is capable of a variety of finishing operations, including anodizing, electroplating, porcelain enameling and organic coating. Me-



An enameled panel is removed from porcelain enameling furnace.



Miniature aluminum tumblers are processed on anodizing line of the new pilot finishing facilities.

chanical finishing facilities are available for buffing and polishing of aluminum surfaces by conventional means. Aluminum panels up to 36 in. x 60 in. can be cleaned, etched, bright dipped, anodized, dyed and sealed by use of the anodizing line. A current source of 3,000 amperes is available to feed a line of 300 gallon tanks.

An electroplating line is available consisting of 120 gallon tanks with in-

dividually controlled current sources available for separate adjustment at various tanks. Panels up to 24 in. x 32 in. or smaller parts can be processed on this line. Cleaning, etching, bright dipping, zincating, stripping, conversion coating, and electroplating by commercial and experimental methods are among the processes available.

Organic coating equipment includes a spray booth, roller coater, dip coater and conventional painting, lacquering, varnishing, enameling, mixing, blending and other equipment. The same facilities, a high temperature furnace and ovens are used for fusing and curing experimental and pilot runs of porcelain enameled aluminum. Panels up to 18 in. x 22 in. can be porcelain enameled and organic coatings can be applied to panels up to 36 in. x 48 in.

The pilot facilities have been useful for production of panels for large scale testing such as outdoor exposure evaluation of coated aluminum surfaces. Samples have been processed for interested customers to demonstrate the use of a finishing facility and to provide



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with this 12 gal. Semi-hard Rubber
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- Here's a container made of thick rubber that will outlast stoneware jars or crocks and save you time and money.
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LBNI series
all plastic
self-priming
Cap. 50-350
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PRECIOUS GOLD
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over
25 models
designed to fit
your needs
from 50-3000
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FILTER PUMP UNITS

No leakage, no metal contamination
with all-plastic self-priming and
transparent plastic filter chamber.
Anti-corrosive plastic construction
uses BunaN, H.T. Lucite, Neoprene,
Teflon, Rigid PVC, Hypalon, Vinyl,
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REVERSAL SWITCH
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finished aluminum pieces for further testing and evaluation by the customer.

The anodizing equipment has been used for large scale evaluation of the anodizing quality of experimental alloys as well as for semi-production of new anodizing alloys for actual use. An example of the latter is the production of a considerable number of gold-colored sheets and samples produced by the gold color process developed by the department.

Silver plating of aluminum bus bar for low contact resistance has been done on a scale sufficient for permanent installations of this application of electroplated aluminum.

American Smelting Enlarging Central Research Laboratories

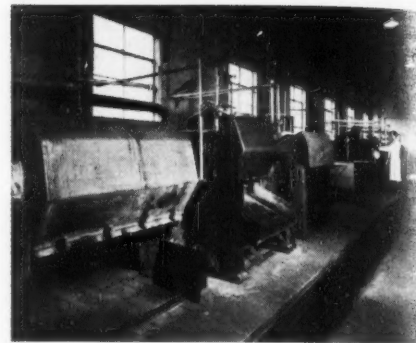
American Smelting and Refining Co. is expanding its central non-ferrous metal research laboratories at South Plainfield, N. J., by one-third. The company's expansion and diversification, plus increasing applications for non-ferrous metals and elements necessitates the addition of more than 20,000 square feet of laboratory space.

The new laboratories will be devoted to asbestos application and process research for ASARCO's subsidiary, Lake Asbestos of Quebec Limited; to the production and study of high purity metals; and for research on refractory metals such as the rare earths and other high temperature metals.

A completely new wing will be added to the present laboratory structure, which was completed less than five years ago. Construction will begin immediately, and full operation is expected by the end of the year.

Lord Chemical Corp. Opens Research and Experimental Center

What is believed to be the world's largest research and experimental center for barrel finishing of metals and plastics was recently opened by the *Lord Chemical Corp.*, 2068 S. Queen St., York, Pa. The new 40 by 120 ft. plant addition contains an experimental tumbling room 40 ft. wide by 73 ft. long; chemical laboratory 19 by 21 ft.; office, sample-storage space, and a



Shown is one of two rows along the long sides of the room, where 30 barrel finishing machines represent every available type. Individual 1-in. water lines to each barrel are fitted with quick-acting valve and swivel spout. Floor slopes for drainage to the channel running across lower right corner.

modern display room 38 by 19 ft. to show barrels and related equipment.

The experimental barrel-finishing shop was designed and built to embody every modern concept in this method of precision finishing. Arranged in rows along the two long sides of the room are 30 barrel-finishing machines, representing every available type: horizontal octagonal, horizontal hexagonal, triple-action, tiltable, submerged, wire-

Don't Throw Buffing Compound NUBBINS Away!

We remelt Nubbins — ship you whole bars.

Did you ever figure how many pounds are lost because your Nubbins are discarded?

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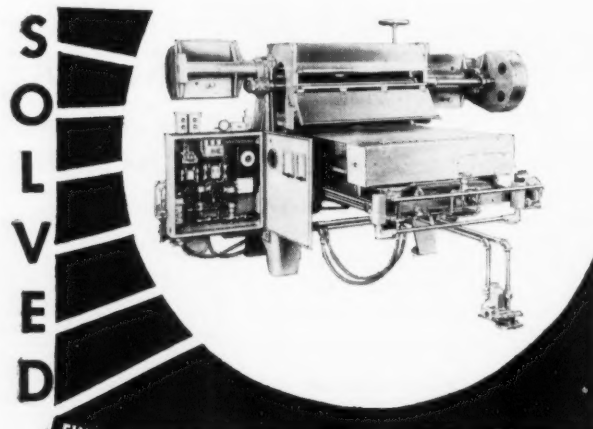
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Model No. 203A CLAIR Surface Finishing Machine is YOUR answer!

Single Spindle Vacuum or Platform Table Design. It will accommodate work up to 48" long and 40" wide, or as many small pieces per load as can be nested on the table.

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Carl O. Brandt, chemical engineer, research and development, is measuring the microinch finish on a small part. This modern chemical laboratory has equipment and facilities necessary to conduct extensive researches into the problems of barrel finishing.

mesh, wooden tumbling and wooden finishing barrels are all included.

Parker Rust Proof Announces Appointments

The following appointments to the sales-service force have been announced by Parker Rust Proof Co.

D. A. Golby and J. E. Lewis have been assigned to the South Central region office with headquarters in Cleve-

land. Mr. Golby will live in Pittsburgh and cover accounts in that area. Mr. Lewis will cover accounts in northern and central Ohio.

W. N. Jones has been transferred from the Research and Development Department to the Sales Department, where he has been assigned to the Cold Forming Division. He will be operating out of the Detroit Office.

R. E. Covert has been assigned to the Central region office with headquarters in Detroit. Mr. Covert will cover accounts in Detroit and its environs.

Kelite Corp. Appoints O'Brien

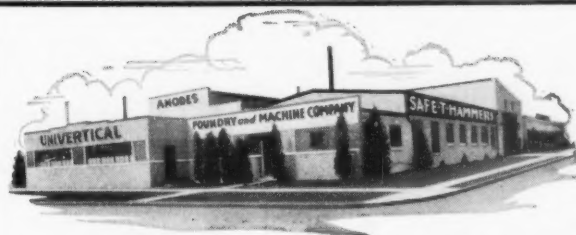
John E. O'Brien has been appointed district sales manager of the Philadelphia sales district for Kelite Corporation, manufacturers of industrial chemicals and steam cleaning equipment. He will have responsibility for all sales in Pennsylvania, Maryland, Delaware, Virginia, West Virginia, and southern New Jersey. Mr. O'Brien had previous sales and sales management experience with the metal processing department of Pennsylvania Salt Mfg. Co.



John E. O'Brien

A. E. Sakavich has also been named in charge of sales development service. He will be part of the firm's marketing department in Berkeley Heights, N. J., where his duties will include advertising and sales promotion. Mr. Sakavich was formerly associated with The Monaghan Co. Inc., Newark, N. J., as an account executive.

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buy DIRECT from METAL CONVERTER!
Nickel anodes up to 93 inches in length . . . of the highest purity. Density of anodes is at a maximum. Longer life in plating bath.

NICKEL RECASTING PRICE SCHEDULE
ANY QUANTITY only 99+ purity accepted
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Just heat
to 300° F.
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When Rubberite cools, it has characteristics similar to soft rubber. Will not crack, scale, or run in the hottest weather. Write for complete information.

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News from California

By Fred A. Herr



In line with a trend toward job shop specialization in the plating field on the West Coast, Olympic Plating and Polishing Works, 843 Naomi Ave., Los Angeles, is devoting its activity exclusively to finishing tubular metal work. The firm, which is operated by Nathan M. Lichtback, turns out 6,000 chairs a month for the furniture trade. In addition to the plating operations, the company features the enameling of frames, using an electric oven employing 136 500-watt infrared lamps for the baking process.

The plating facilities consist of nickel, chromium, copper, and brass installations, plus a complete polishing and buffing section.

Franklin T. Andrews, president of North American Industrial Engineers, Inc., of Los Angeles, has announced the formation of a corporation known as Manufacturers' Service, Inc., which will handle job shop precision tumble finishing jobs on metal and plastic parts. A plant has been equipped at 2210 Chico Ave., El Monte, Calif.

The firm will also handle, on an exclusive distribution basis in the eleven western states, the B.M.T. Mfg. Corp.'s Multi-Barrel slide honing machinery, and Finger Lakes Chem. Co.'s Lakeseal Organ-Tu universal tumbling compounds. Abrasives and barrel finishing compounds will also be distributed, it was announced.

Alan J. Bronold is president; Paul M. Maurer, vice-president; Joseph B. Hyde, Jr., secretary-treasurer; William A. Barbeau, general manager; and Francis J. Dino, factory manager.

The Norton Company, abrasive manufacturers, recently opened a new laboratory in Santa Clara, Calif., as part of its central California production operations.

The laboratory is designed for demonstrating the firm's ceramic spray coatings. The facilities consist of three spray guns and auxiliary equipment, and duplicates similar installations in the main plant in Worcester, Mass. The ceramic coatings being marketed by the firm under the name of Rokide are used in protecting surfaces exposed to high temperatures, such as occur in rockets and jet engines.

The E. D. Bullard Company, producers of safety equipment for industrial plants, has moved its San Francisco plant from 275 Eighth Street to 2680 Bridgeway, same city.

Anadite, Inc., of South Gate, Calif., one of the leading metal finishing firms on the West Coast, will open a new plant in Hurst, Texas, on April 1 to serve the southwestern area of the United States in producing Chem-milling and various forms of metal finishing on aluminum, magnesium and steel. The Texas plant will also operate the Hardas process of hard anodizing for which they hold the ex-

Alert BUFFING COMPOUNDS

MADE IN CALIFORNIA

And formulated specifically for local needs

ISO-BRITE COPPER

Wagner Bros.

AFTER THREE MONTHS' TRIAL, ONE USER
STATES

"This process does a remarkable job for us.

First, It is economical.

Second, it is easy to control.

Third, The speed claimed by Wagner Bros. is conservative."

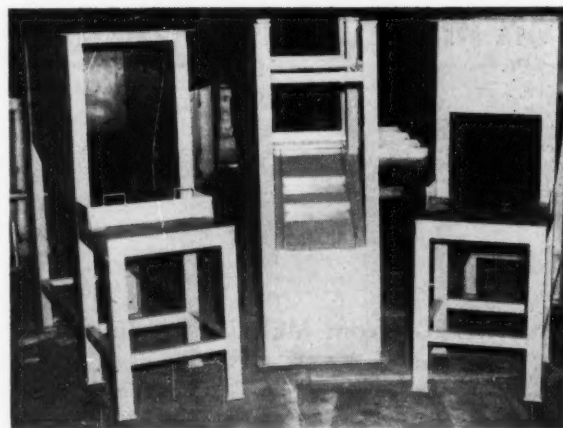
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Avoid time-wasting bottlenecks by designing transportation and storage units exactly to fit your production. Have them welded by Storts to be sure of full strength construction and more years of trouble-free, maintenance-free, satisfactory service.

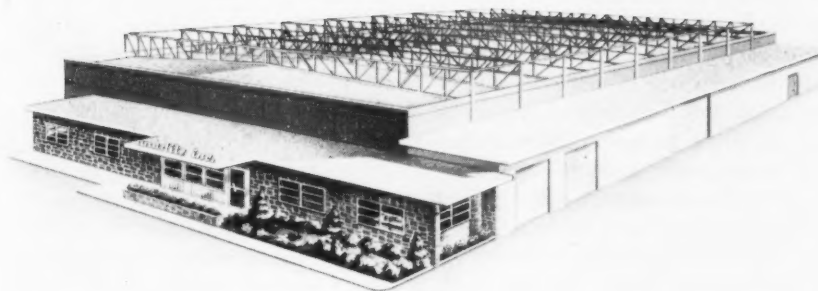
STORTS WELDING COMPANY INCORPORATED

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MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

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clusive license in the United States.

The new facility, it was announced, will serve the missile, aviation, electronic and general industries under the name of Anadite, Inc. of Texas. The Texas plant represents an investment of \$500,000 and is constructed

on a three acre site of 20,000 square feet. In addition to the main processing building, there are several other structures designed for warehousing.

Glenn Boehmer, an officer of the parent company, has been named to head the Texas operations.

The Diversey Corp. of Chicago, Ill., has divided its Pacific Coast sales division into three separate divisions, with headquarters, respectively, in Los Angeles, San Francisco, and the Pacific Northwest. The realignment on the West Coast was part of a larger divi-

sion of districts, which also saw the eastern and southern divisions undergoing changes.

As part of the revision, J. R. McBrien, formerly manager of the North Central Division, has been transferred to the Pacific Coast as Pacific regional

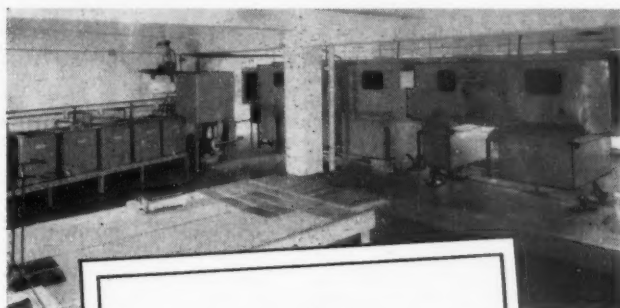
manager. He has been succeeded as North Central Division manager by R. C. Cheek.

The Southern Pacific division, with headquarters in Los Angeles, is headed by F. G. Morgan; the Northern Pacific Division, with headquarters in San Francisco, by Frank Berus; and the Pacific Northwest division by W. D. Funston. The new San Francisco district manager is Sam K. Smith.

C. F. Wentworth continues as California district manager of the metal industries department.

The Marblette Corp. of Long Island City, N. Y., has appointed Raw Chemicals, Inc., of Gardena, Calif., as its new western sales and service representative for its line of epoxy and phenolic resins for casting, laminating, surfacing, encapsulating and other purposes in the plastic tooling and other phases of industrial production.

Raw Chemicals, Inc., itself produces pigment dispersions, parting agents, catalysts and specialty chemicals for aircraft, electronic equipment, and reinforced plastic fabricators.



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A. H. Brauner, Jr., manager of the export sales division of the W. P. Fuller & Co., San Francisco paint manufacturers, returned late in February from a month of business consultations in the Orient.

On his schedule was a visit in Tokyo, Japan, with officials of Mitsui Bussan Kaisha, Ltd., distributor of Fuller industrial finishes in Japan. Discussed were plans for a joint venture to manufacture specialized industrial coatings in Japan.

Richard G. Grinnel has been appointed district sales manager for Metal Building Products Corp. of North Hollywood, Calif. The firm recently was named as sales agency for eastern building products manufacturers. Grinnel will serve in a similar sales capacity for Fabricated Steel Service, Inc., and Hoist & Crane Mfg., Inc., located at the same address in North Hollywood as Metal Building Products Corp.

A growing shortage of properly

trained technicians in the coatings and paint industry has influenced the Los Angeles Paint and Varnish Production Club to evolve a plan for interesting high school students in the industry. At the February meeting of the association it was proposed that paint industry firms hire students of science and mathematics during their summer vacations in order to acquaint them with the industry. Publicity on such placements would also be available for further summer work between semesters in following years.

The educational session of the meeting was addressed by John Close of the Harshaw Chem. Co. The subject covered "Dispersed Colors," and included a review of the constituents of water dispersed colors as well as the advantages of press-cake colors as compared to dry pigment dispersions for use in emulsion paints.

Crescent Carbon Corp., a subsidiary of the Crescent Corp. of Tulsa, Okla., initiated production of carbon and synthetic graphite in its new plant near Lancaster, Calif., in mid-February.

The plant is the first for production of carbon graphite products on the west coast and is located in the Antelope Valley area of Los Angeles County. The plant is equipped for production of carbon and graphite anodes, electrodes, electrolytic anodes, and other carbon and graphite products.

The E. S. Gilmore Co. of Los Angeles has been appointed to handle the sale of the graphite products in the eleven western states.

Clifford W. Brown, president of Narmco Resins & Coatings Co. of Costa Mesa, Calif., has announced plans for construction of a \$225,000 addition to the Costa Mesa production center that is expected to increase the firm's output of aircraft structural adhesives and laminating materials by 100%.

Approximately 7,000 square feet of factory area is to be added. The new facilities will be designed especially for processing of structural raw materials to aircraft and missile requirements, and will employ explosion proof electrical systems, special pumping and piping systems for resins and liquids.

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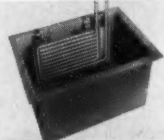


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Associations and Societies

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Newark Branch

The February meeting was held on the 15th with President *C. Struyk* presiding over the 90 members and guests present.

Three men were elected to membership, *Adolph Dobbe* of Diamond Hard Chromium Co., *Robert Duva* of Sel-Rex Corp., and *Warren McMullen* of Hanson-Van Winkle-Munning Co., and eight applications were received.

The nominating committee, *R. Ehrhardt*, chairman, *T. Austin* and *J. Kosmos*, presented a slate of officers for the election to be held in March. *William Grigat*, chairman of the membership committee, noted that each member of the Branch, as a member of the committee, received an application

with the February Sparks. He also pointed out the fact that this year Newark is leading the first division in membership increase and that each member should be interested in keeping the Branch there.

D. Foulke, reporting in the absence of *George Wagner*, stated the Christmas Party had been a financial as well as a social success with a profit of about the same as last year in spite of holding the ticket cost in face of higher meal costs.

He also reported Technical Societies Council of New Jersey symposium "Controlled Quality—A Key to Profits" and an evening program on "Some Problems in Processing Water" was scheduled for the afternoon and evening of March 28, 1957 with tickets available from Carr, Foulke, and Struyk.

Dr. Dodd Carr then introduced *Dr. Karl Schumpelt* of Sel-Rex Corp. who discussed "Rhodium Plating—Past and Present," reviewing past difficulties and pointed out how a trace of lead accounted for improved deposits at one

time. He predicted for the future more use of heavy deposits, due to the fact that they can now be deposited with low stress.

Richard Hafer, chief finishing engineer of Reynolds Metals Co., then presented the principal talk of the evening: "New Developments in Anodizing Aluminum." Mr. Hafer discussed reasons for porous and non-porous anodic coatings and the properties of the two types of films. A number of slides were shown of the various applications for which aluminum is now used.

The number of queries at the close of the talks attested to the interest in both subjects presented.

D. Gardner Foulke
Secretary

British Columbia Branch

The fifth general meeting was held on February 12, 1957 at the National Film Board theater, 535 West Georgia St., Vancouver, B. C. and commenced at 8:15 p.m. 29 members and guests were present.

The secretary read the minutes of



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the previous meeting which were approved. President *Bill Marquardt* mentioned receipt of copies of the "Branch Officer's Manual" and also advised the membership that a request for a permanent charter had been granted and that in all probability it would be officially presented by the national president on March 29 or 30. There was a discussion re the possible donation of books to the new civic library which was referred to a later meeting.

J. Lee discussed the films to be shown, which were "No Man is an Island" from Consolidated Mining in Trail, B. C.; "Motormania" a Walt Disney short on safe driving; and finally "Breakthrough" showing the use of Ingersol-Rand compressors and drills in completing the underground tunnel at Kitimat, B. C. The film originally scheduled "Corrosion in Action" unfortunately did not arrive in time so it will be shown at a later meeting.

The meeting adjourned at 10:30.

J. Lee

Secretary

Central Michigan Branch

The Central Michigan Branch met on February 12 at the Porter Hotel in Lansing. The business meeting, opened by President *G. S. Woodruff*, concerned the coming election of officers, and a discussion of possible changes in meeting nights and locations.

The speaker for the evening was the National AES second vice-president, *Herberth E. Head*, of the Chrysler

Corp., whose subject was "Electroplating on Stainless Steel." Because of the excellence of the presentation and the interest in the subject in this automobile-trim conscious area of Michigan, the lively discussion and social hour continued for hours.

Earl D. Creese

Publicity Secretary

Detroit Branch

The February meeting of the Detroit Branch was held in the Founders' Room of the Sheraton-Cadillac Hotel on February 1, 1957. President *Howard McAleer* opened the meeting at 8:20 p.m. He asked for nominations from the floor for the coming elections. As none were forthcoming, the nominations were closed. The National Society has appointed *Manuel Ben* as vice-chairman of the 1959 convention.

Clarence DeGrote was appointed editor of the "Scoop" sheet which will accompany the meeting notices from now on. He will report on local color personalities and production of members individually or company wise of the Branch. As usual, *John Hitchcock* was appointed chairman of the Tellers' Committee for the coming elections. Educational Chairman, *Doug Thomas*, announced that the March meeting will be Ladies Night. Speaker of the evening will be *Robert DeVor* of the DuPont Co. His topic will be, "Progress Must be Created."

Bert Lewis, of the Northwest Chemical Co., welcomed the old timers, as this meeting was in their honor. He

also introduced *Ernest Bechtel*, speaker of the evening. Mr. Bechtel's speech, "The Development of Plating since 1907" was very reminiscent for many of the two hundred members in attendance.

The meeting was adjourned about 10 p.m., followed by refreshments.

Patrick J. Driscoll

Pittsburgh Branch

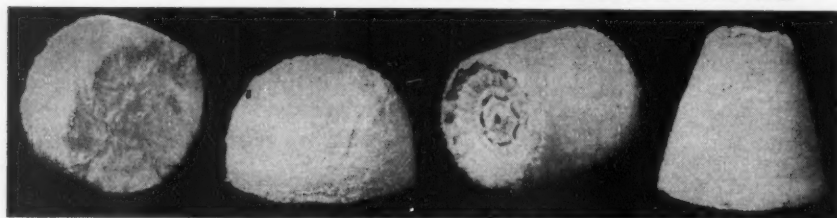
The regular monthly meeting of the Pittsburgh Branch was held February 6 at the Gateway Plaza in Pittsburgh. Dinner was attended by approximately 65 members and guests. Included were 23 wives of members who hope to start an auxiliary in Pittsburgh. After dinner President *M. Ceresa* welcomed the ladies and introduced *R. Burford*, who was chairman of the committee to get the ladies out. Entertainment in the form of a bingo game was provided for the women while the men held their regular business meeting. Prizes were donated by the various suppliers of the area.

The first item of business was the election of *John C. Fugazzi* of National Casket Co. to membership in the Society. A report on the Ladies' Night Banquet scheduled for Saturday, April 27 was given by President *Ceresa*. This gala affair is to be held at the Gateway Plaza and promises to be a very worthwhile evening of entertainment for our membership and friends. *R. Burford* and *F. Mountain* are handling the arrangements this year.

There were ten guests present at the meeting so each was asked to introduce himself and tell of his company affiliation. A letter from *J. Coros*, who was absent due to a recent accident, was read concerning the January Interim meeting. The meeting was attended by fifty to fifty-five delegates and National Officers of the Supreme Society making it one of the most successful since this type of meeting was instituted by Past President *Cleve Nixon*.

The slate prepared by the nominating committee under the chairmanship of *E. J. Smith* was read by Secretary *F. Stevens*. It is as follows: President, *I. H. Schram, Jr.*; First Vice-President, *J. R. Crain*; Second Vice-President, *W. F. Pizoli*; Secretary, *W. F. Stevens*; Treasurer, *R. E. Woehrl*; Librarian, *W. J. Musmanno*; Delegates, *E. J. Smith*, *Myron Ceresa* and *R. A. Woof-ter*; Alternate Delegates, *R. H. Schind-*

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ler; R. E. Varner and R. J. Goldbach; Board of Managers, R. E. Varner, R. H. Schindler and Myron Ceresa. Nominations were then invited from the floor by President Ceresa. There were none, but President Ceresa reminded the group that nominations will be open again before the election next month. The meeting notice for the March meeting will also include the Nominating Committees' slate and invite others to be nominated from the floor.

Librarian R. E. Woehrle introduced Dr. S. Spring, Laboratory Director of the Kelite Corp. The subject of Dr. Spring's paper was "Preparation of Metal Surfaces for Painting as by Phosphatizing." During the short break which followed Dr. Spring's paper, the drawing for the door prize was held. The prize, a beautiful Lazy Susan donated by R. Goldbach of Harshaw Chemicals was won by E. Keller. The Ladies also had a grand prize, an electric fry pan, which was won by Mrs. J. Meehtly.

Following a few questions and some discussion of phosphating, the meeting was adjourned.

Fred Stevens
Secretary

Chicago Branch

The regular monthly business and technical meeting of the Chicago Branch was held Friday, February 8, at the Western Society of Engineers. The general subject for the evening was "Conversion Coatings." The first speaker, Rudy Huzucha of the Clinton Co., discussed "Organic Finishes" with respect to plating. Rudy, an old time member of the branch has distinguished himself by not missing a meeting in 42 years. He also was given a Meritorious Service Award by the society last year. Rudy discussed water-dip lacquers, precipitating thinners, and lacquers for brass finishes. This informative discussion was concluded by a very interesting question and answer period.

The second speaker of the evening was our own Dr. R. E. Harr of the Western Electric Co. and president of the Chicago Branch. He discussed the evaluation studies made by A.S.T.M. on zinc plated panels treated with various types of chromate films. A series of colored slides was used to show the appearance of the panels after the exposure periods. Russ pointed out that this work was in its preliminary stages

and that an attempt is to be made to correlate these exposure results with those obtainable in accelerated corrosion tests.

The meeting was well attended and proved to be informative.

J. C. Corre
Publicity Chairman

Chicago Branch

The 45th educational session and banquet of the Chicago Branch was held at the Conrad Hilton Hotel on Saturday, January 26, 1957. The executive secretary of the National Society, John P. Nichols was officially introduced to the Branch. Among the guests were Herberth Head and Ralph Wyssong of the National Society and Peter Kovatis, secretary of the N.A.M.F.

Three timely and interesting papers were presented at the afternoon session. They were as follows:

1. "Structural Materials in Reactor Design," Dr. J. H. Monaweck, Associate Chemical Engineer, Argonne National Laboratories.

Dr. Monaweck described some of the materials that are used to construct atomic reactors. He also discussed the types of plating used as well as the conditions the plating must withstand.

2. "Gas Plating," Melvern J. Hiler, president, Commonwealth Engineering Co.

This paper covered the equipment and the reactions involved in depositing metal from the gas phase rather

than from electrolysis such as is normally done in electroplating.

3. "Hydrogen Embrittlement," Dr. L. D. McGraw, assistant chief of the Electrochemical Engineering Division, Battelle Memorial Institute.

This paper covered a discussion of mechanism for the entry of hydrogen into basic metals, the measurements of hydrogen damage, and the relief of embrittlement.

The technical sessions were very well attended and proved to be profitable to all. The day came to a close with the annual banquet which was enjoyed by all the 1100 persons present.

J. C. Corre,
Publicity Chairman

New Haven Branch

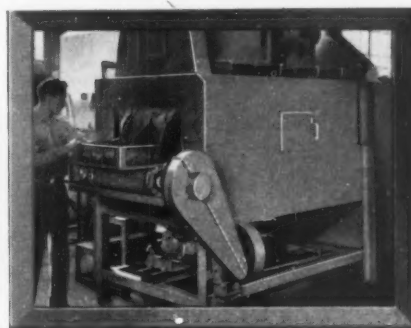
The February meeting of the New Haven Branch was called to order at 8:15 P.M., February 12, 1957, by President, Austin Jackson. The roll call of officers was held. A moment of silence in memory of L. Rosenthal, a charter member of the New Haven Branch. The Educational Committee's report was read by C. Kuster. This report had to do with technical papers for Plating, the answer received from Frank Eddy and what New Haven's answer should be. It was suggested by Al Ferguson that Mr. F. Eddy or any other National officer be invited to attend a meeting of the New Haven Branch and discuss the problems with the members.

Ed Foley reported on the course of

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platers given at New Haven College. The first session of 15 weeks has been completed with 10 students completing the course. The 2nd session will start February 18, 1957, and will run for 15 weeks. The sessions will be on "Electroplating Solutions."

The motion was made and seconded that the membership committee send out questionnaires to all members on why we do not have better attendance, what their interests are, etc. Motion passed.

A motion was made and carried that new members be given the A.E.S. pin upon acceptance into the Society. A suggestion was made that the present members obtain lapel pins to wear. This pin would let people know who is an A.E.S. member and might aid in getting new members.

A letter from the Bridgeport Branch announcing their "Old Timers Night" to be held on February 28, 1957, was read. *Austin Jackson* gave a report on the Regional meeting. The Regional Convention is all set for April 27, 1957, at the Statler Hotel in Hartford, Conn. *Dr. Walter Meyer* of Enthone, Inc., *Dr. Harry Walker* of Walker Division, *Norma Hoffman* Bearings, and *K. L. Bellinger* of Conversion Chemical Corp. will be the speakers. Dinner and dancing will follow the Educational and Ladies' programs.

At this point the meeting was turned over to *Wm. Hottel*, the technical chairman. Mr. Hottel introduced the speaker of the evening *E. L. Combs*, Chromium Chemical Division, Diamond Alkali Co., Cleveland Ohio. Mr. Combs' subject, "Chromium Plating Up to Date," was very well presented and very educational. A lively question and answer period followed. The door prize

was donated by *Wm. Hottel*, Diamond Alkali Co., Cleveland, Ohio. The meeting adjourned at 10:15 P.M.

B. Gaffney,
Sec.-Treas.

Los Angeles Branch

More than 200 years of plating experience were represented by the seven charter members of Los Angeles Branch, who were guests of honor at the "Charter Members Night" on February 13 at Rodger Young Cafe, Los Angeles.

Seven of the nine living members who assisted in the founding of the branch in 1930 were present and served as panelists in a two-hour discussion on "How things were done in plating 30 years ago."

With *Earl Coffin*, himself a charter member, as master-of-ceremonies, the following founding fathers were introduced:

John Merigold, retired, who started his plating career on the Atlantic Coast more than 50 years ago, and then operated the Merigold Plating Co., a precious metal plating shop, in Los Angeles, for more than a quarter century until his retirement a few years ago.

Bernie C. Gardes, who is still active as manager of the plating department for Plating, Inc., Glendale, Calif., and who, during his 35 to 40 years in the industry, has operated various shops of his own in Southern California.

Edwin Post Robinson, retired for 20 years and living on a farm near Norwalk, Calif., son of the man known as "Robinson the Plater" in Chicago a half century ago. Mr. Robinson was active with the Snow Mfg. Co. in Los

Angeles for many years as a plater of gas heater parts. Back in the middle-twenties Mr. Robinson succeeded *Clarence Thornton*, also a charter member, when Thornton resigned from the company's plating department to engage as a plater of gold-plated bank signs in the San Fernando Valley area of Los Angeles.

Don Bedwell, plant superintendent for Hall-Mak Co., Los Angeles, known as the "dean of Southern California platers." Bedwell has been a part of the plating industry of Los Angeles for nearly 40 years. At the time the branch was being established he operated Deluxe Plating Co. at 109 East 31st St., Los Angeles, in partnership with his brother, *Gene Bedwell*. He has been plant supervisor for Hall-Mak for the past 18 or 19 years. He is an honorary life member of the Supreme Society.

Ray Vasquez, now in the plating department of Keystone Mfg. Co., North Hollywood, Calif. A few days after *Earl Coffin* opened his Palace Plating Co. in Los Angeles in 1927, Vasquez showed up and asked for a job as a plater. Earl was filled up but agreed to put Ray on for a week or so of temporary work. The job lasted 25 years and ended only when Earl sold his shop in 1952 to join the sales staff of the L'Hommedieu Co. in Los Angeles.

Harold Coombs, president of Crown City Plating Co., Pasadena, Calif. Mr. Coombs came to Southern California from Eastern Canada many years ago, served as manager of Crown City after it was established by his father, and later ascended to the presidency. His

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son, *Robert L. Coombs*, is also active in the firm today.

Earl Coffin, as master-of-ceremonies, was too modest to talk about himself, but he has had a long and honored career in Southern California plating. He operated his own shop, *Palace Plating Co.*, in Los Angeles, for 25 years and, in the early 1950's, sold out with the idea of retiring. His retirement lasted four months, when he joined the sales engineering staff of *L'Hommedieu's* Los Angeles branch, and is still active today in calling on the plating trade.

Two other charter members were unable to attend because of ill-health—*Clarence Thornton*, manager of *L'Hommedieu's* West Coast branch in Los Angeles; and *Phillip Virtue*, president of *Virtue Bros.*

The Messrs. *Merigold*, *Gardis*, *Robinson*, *Bedwell*, *Coombs*, and *Vasques* manned a panel that answered questions and discussed old-time plating methods as compared to today's techniques. Mr. Coffin moderated the discussion.

Mr. *Merigold* had some interesting comments on salt water gold plating technique of 40 or so years ago. The plating arrived at by that method, Mr. *Merigold* explained, was very thin and, in reply to a question of how they measured the thickness of the gold, he replied: "We didn't measure it. There was no such thing as measuring the gold deposit. I don't think we got around to measuring the thickness until around the time of World War I." Mr. *Coombs* explained that platers were more or less compelled to keep the thickness of gold plate down so the government would not try to tax the finished product as a luxury item.

This caused them to keep the deposit as thin as was consistent with efficiency, and the plating was done with 22 karat gold.

The discussion then veered into a side-track about electroless gold plating, a comparatively recent development. *Al Sulzinger*, plating foreman for *Hughes Aircraft Co.*, *Culver City, Calif.*, reported that his shop was doing some electroless gold plating with deposits measuring as thin as 30 millionths in thickness.

In reply to a question of what alloy of gold was being used today, *Henry Saklad* of *Sunset Plating Co.*, *Burbank, Calif.*, replied that in that shop they still stick to the commercial 24 karat gold cyanide bath.

Mr. *Bedwell* and *Earl Coffin* took over the lead in a subsequent discussion of "old time solutions." Mr. *Bedwell* commented on early copper baths. The trouble with them was, he said, that they had rather poor adhesion. He discussed the old time acid copper bath and told why he had used it in the old days and why he eventually quit using it.

Other subjects covered in the general discussion included how cyanide copper can be kept soft enough to buff; how to polish and buff copper; types of buffs to use; pyrophosphate copper; fluoborates; and the value of a P.R. unit in copper.

Seven new members were installed at the February meeting. They were *Charles King*, *Robert L. Coombs*, *Robert J. Swisher*, *James Phelan*, *C. J. Bockman*, *Downey Morgan* and *Jerome A. Weaver*. The applications of eleven others were received for future processing.

Harvey Hunt, general chairman, re-

ported on arrangements for the branch's 27th annual educational session and dinner dance which is to be held at the *Ambassador Hotel*, *Los Angeles*, on *March 23*. A slate of candidates for new officers was submitted by *G. Stuart Krentel*, nomination committee chairman. The election will be held *March 13*.

It was reported that *D. E. Eldred*, who was hospitalized with a severe heart attack a year ago, is still at his home, *8804 Duarte Road*, *Arcadia, Calif.*, and would welcome visitors.

Indianapolis Branch

Thirty-two members and guests of the *Indianapolis Branch* enjoyed a steak dinner at *Fox's Steak House* on *February 6, 1957*. *Marshal Whitehurst*, president, called the meeting to order at 8 P.M. and asked for introductions. Minutes of the *January* meeting were read and accepted. Treasurer's report was accepted as read in a motion by *Q. Shockley*, which was seconded and carried.

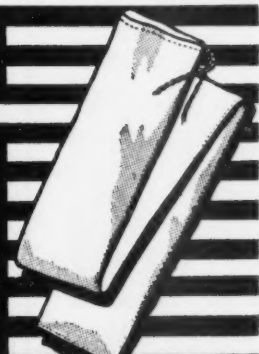
Les Reynolds, reporting for the *Tri-State* committee, called attention to a good financial condition and that the advance details of the *March 30th* meeting has already been mailed. *Harry Smith* made a motion, which was seconded by *Elmer Lundberg*, that the branch re-elect *Fritz Anderson* as senior member, and *Les Reynolds* as junior member of *Tri-State Region AES* for 1957 term. Motion was carried.

John Hood reported the following items as the high lights of *January Intermin Meeting*. *Herberth Head* suggests that membership committee take on three members and drop three members each year. The possibility of

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changing the name of "Plating" was definitely turned down. Present membership totaled 7,244. The National AES wants more space to do a better job. All committees to have nine members with three year terms staggered, having three on and three off each year. Delegates suggested that "Intermin Meetings" be held in smaller AES branches.

Dave Sivertsen reported the "Paper Committee" needs more time to compile all of the notes because a large part of the experimental work is carried out in other plants, but the initial draft should be ready for May meeting.

Marshal Whitehurst stated that the March 6th meeting will be "Sustaining Membership" nite and it will be held at the Continental Hotel. *John Holland* made a motion for the branch to approve the expense of all of the invited guests. The motion was seconded by *Harry Smith* and carried.

Dr. A. Max made a motion for the branch to subscribe for Sustaining Membership for 1957. Motion was seconded and carried. *Dr. Max* reported that to continue the Purdue Extension class on plating, a minimum of 16 will be required and 12 more must register by tomorrow nite.

Loren Stevens introduced *Raymond Kotz*, of Belke Mfg. Co., who gave a lot of practical information on plating racks. Write up of his presentation

was made in May 1956 meeting of Miss. Valley branch. Meeting was adjourned at 9:35 P.M.

Paul Freeman
Secretary

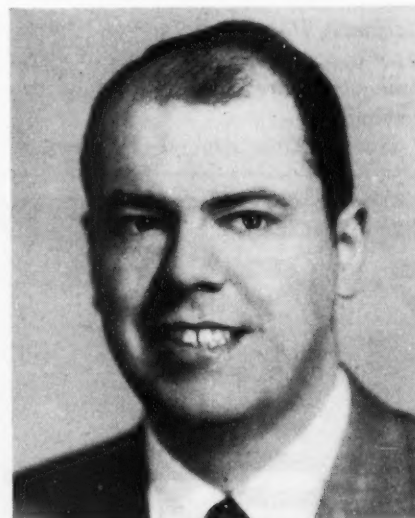
Pittsburgh Branch

The Pittsburgh Branch of the American Electroplaters' Society will hold their annual Dinner and Dance on Saturday, April 27, 1957 at the Gateway Plaza Main Dining Room.

The program includes a fine steak dinner, dancing to Lee Kelton's orchestra, door prizes, favors to the ladies and free parking at the Gateway garage. Tickets are priced at \$7.50 per person.



R. M. Burford, Jr.



F. W. Mountain

The co-chairmen, *Bob Burford* of Pennsalt Chemicals and *Frank Mountain* of Hanson-Van Winkle-Munning Co., invite all those who are interested in this affair to attend. Reservations

should be made early so that a dinner may be ordered in advance. You may contact either Mr. Burford, Mr. Mountain or Myron Ceresa, President of the Pittsburgh Branch. Mr. Ceresa may be reached at Westinghouse Electric Corp. by calling EXpress 1-2800, Extension 2419.

THE ELECTROCHEMICAL SOCIETY

The Electrochemical Society, Inc., will hold its 11th meeting at the Hotel Statler, Washington, D. C., from May 12 to 16, 1957. Six divisions of the Society will hold sessions at that meeting.

The Theoretical Electrochemistry Division, and the National Science Foundation have scheduled a joint symposium of six sessions on the structure of electrolytic solutions (electrolytes): speakers from all over the world will present papers at this symposium. The Theoretical Electrochemistry Division, has also scheduled two general sessions.

NATIONAL ASSOCIATION of METAL FINISHERS

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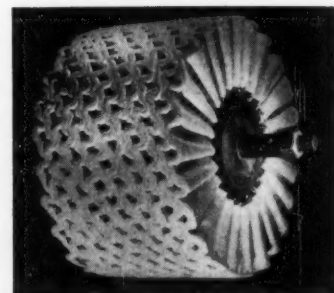
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NAMF President *John Palik, Jr.*, has submitted a list of names of job-shop operators to BDSA to serve on the important Advisory Committee.

AMERICAN SOCIETY FOR TESTING MATERIALS

ASTM Committee Outlines Atmospheric Exposure Program

At its meeting in Philadelphia, February 8, 1957, ASTM Committee B-8 on Electrodeposited Metallic Coatings reported on a preliminary outline of an atmospheric exposure program entailing 27 plating variations of panels at three test sites. The specimens cover copper, nickel, and chromium plating on various aluminum alloys and also include similar plated coatings on steel panels for comparison.

A Summary of Observations of Factors Influencing Adhesions of Organic Coatings to Chromium Plated Surfaces was presented for Committee B-8 approval. The purpose of the report is to serve as a guide for those interested in the use of supplementary organic coatings on chromium plated surfaces. It will be published in the Committee B-8 Annual Report for 1957.

Committee B-8 was organized in 1941 to prepare specifications for electrodeposited and chemically reduced metallic coatings of all kinds on all types of basis materials, subsequent treatments of such coatings, methods of testing these coatings and materials required for their production; including all pertinent investigations of the substrata, the methods of production, the properties of these deposits and their performance under conditions of use and test; excluding only specifications for metal products to which such coatings are applied.

Officers of the committee are: *C. H. Sample*, The International Nickel Co., New York City, chairman; *R. B. Saltonstall*, The Udylite Corp., Detroit, Mich., vice-chairman; and *D. M. Bigge*, Chrysler Corp., Detroit, Mich., Secretary.

Atmospheric Corrosion Program Planned

ASTM Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys announced at its Committee Week Meeting in Philadelphia the week of February 4-8, 1957, that a new and extensive atmospheric corrosion program is planned on non-ferrous metals and alloys. The program calls for the exposure of many of the newer alloys and some of the metals such as titanium, which have recently become of commercial importance. The exposures will be made at Point Reyes, Cal., Kure Beach, N. C., State College, Pa., and in the New York area (Newark, N. J.). This will provide a mild and a severe marine exposure, a rural and an industrial atmosphere exposure. Plans call for the removal of specimens at the end of two, seven, and up to 20 years.

An eight year program of calibrating various exposure sites in North America has been completed. The data will be published in the near future and will show the relative corrosivity of the various locations. Zinc and steel panels have been used in this project. Initial examination of the data reveals a rather wide range of corrosive conditions.

Standardization of salt fog and other tests continues as experience is gained from cooperative studies between various laboratories. This is part of the continuing program of Committee B-3 to develop engineering information relating to the behavior of non-ferrous

metals when subjected to accelerated and long term corrosion tests. In addition, the committee is concerned with the study and development of test methods, the study of corrosion resistance and development of methods to protect non-ferrous metals from corrosion.

The officers of the committee which will meet again at the ASTM Annual Meeting June 16-21, 1957 at Atlantic City are: *K. G. Compton*, Bell Telephone Labs., Inc., chairman; *E. K. Camp*, Westinghouse Electric Corp., vice-chairman; and *A. W. Tracy*, The American Brass Co., secretary.

I. A. E. S.

The headquarters office of the International Association of Electrotypers and Stereotypers, Inc. was moved on February 1st, from 701 Leader Building to 1058-59 Leader Building, Cleveland 14, Ohio. With expanded activities and new duties assigned to it by the board of directors last December additional office space, mailing room, and storage space was required.

OBITUARIES

GEORGE L. NANKERVIS

George L. Nankervis, prominent in the metal finishing industry for over 35 years, passed away suddenly on

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February 13 at the age of 59. He was founder and president of the *George L. Nankervis Co.*, well known for its engineering and installation of electroplating facilities.

Mr. Nankervis' career in the industry began in 1922, in Detroit, as a manufacturer's representative, handling many of the well known lines of equipment and supplies including Chandeysson Electric and the Meaker Co. He was active in the industry and did much to advance the science of mass production electroplating. He was a sustaining member of the American Electroplater's Society and a past president of the Metal Finishing Suppliers Association. In 1947 he was general chairman of the AES Convention and Industrial Finishing Exposition held in Detroit.

Prior to World War II, Mr. Nankervis began the manufacture of highly specialized plating and anodizing racks, automatic compound applicators and similar equipment for the defense effort. Following the war, he pioneered in the complete engineering and installation of mass production electro-



plating systems, and in 1946 engineered and installed, what was at that time, the world's largest fully automatic electroplating facility for the Pontiac Motor Division, GMC.

Later on he diversified the activities of the company into the custom built testing field. Today in addition to its position in the metal finishing industry, the company is also a major producer of complex electronic and hy-

draulic test instruments and equipment, used in both the automotive and aircraft industries.

Besides his many accomplishments in the industrial world, George Nankervis was widely known for his work with youth groups. Since 1935 he was a member of the board of the Boys' Club of Detroit, a past president, and vice-president of the Boys' Committee of Detroit, and a director and vice-president of Northwest Youth, Inc.

He was a director of the American Ordnance Association—Detroit Branch—and a member of the Engineering Society of Detroit, American Electroplaters' Society and the Newcomen Society.

He is survived by his wife, Helen, and a daughter, Mrs. John R. Clippert and two brothers, Russell and Homer.

EMANUEL COHAN

Emanuel Cohan died on February 5, 1957 of a heart attack. He was president of Cohan-Epner Co., Inc., of New York City, one of the old established job shops in the East. He started as an apprentice in 1902 and formed a partnership with Mr. Epner in 1911.

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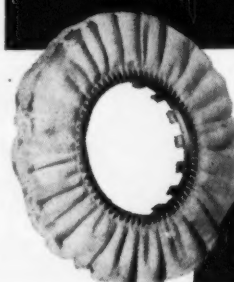
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- 2—Gardner, Type 3DB, double 7½ H.P. individual spindles.
- 3—Divine, Type VCS, 5 H.P. constant speed.
- 6—L'Hommedieu #12, 7½, 10, 15 H.P. Constant speed.
- 5—Acme semi-automatic motor drive buffing workholders.
- 10—Backstand Idlers — Divine, Hammond, Portercable, Manderscheid.

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 - 2—1500 ampere, 0-12 volt, Selenium Wagner, remote control.
 - 1—1500 ampere, 6 volt copper magnesium Mallory Udylite, basic.
 - 1—400 ampere, 0-6 volt Mallory Udylite Jr., self-contained.
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940	32	Elec. Prod.
1500	15	Star
1500	30/50	Century
1500	40/65	G. E.
1500	65	Westinghouse
1500	70	Century
2500/1250	6/12	Elec. Prod.
5000/2500	6/12	Columbia
5000/2500	9/18	Chandeysson

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2700	¾" S.P.	Ilg
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9000	6" S.P.	Northern

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- 1—2500/1250 Ampere, 9/18 Volt, Electric Products, Synch., Exc.-in-head. 25° C.
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1—Steel tank — 30" x 52" x 32" deep, with steam coil

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